Educational Communications and Technology Yearbook

Anna Wing Bo TSO
Steven Kwan Keung NG
Locky LAW
Tiffany Shurui BAI *Editors*

The Post-pandemic Landscape of Education and Beyond: Innovation and Transformation

Selected Papers from the HKAECT 2022 International Conference

Springer

Educational Communications and Technology Yearbook

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The Hong Kong Association for Educational Communications and Technology (HKAECT) was established in 1989. Its first conference was organized in 1990, addressing "The Role of Educational Communications and Technology in Year 2000," with speakers coming from the United States, China, and Taiwan to discuss the outlook on educational communication and technology. Throughout these years, the HKAECT has held a number of international conferences, symposiums, workshops, and talks with various themes to provide a platform to enable rich exchanges for academicians, practitioners, and professionals in the fields of communication and education to discourse about the shaping and changing issues on education, communication, and technology. This Yearbook series collect presentations from the annual international conferences held by the HKAECT. Chapters would come from the annual global call for submission, and be selected based on blind review from international review board. Subject areas include but are not limited to communication, new media, news media, broadcast journalism, democracy and the media, entertainment and education, learning analytics, AI in education, game-based learning, ubiquitous learning, MOOCs, open education, instructional design, social context and learning environment, social media, risk and ethics in new media, etc.

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HKAECT

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2023 Critical Reflections on ICT and Education

Preface

Since 1989, HKAECT has organized 17 international conferences in 33 years. In 2022, the Hong Kong Association for Educational, Communications and Technology (HKAECT) co-organized its annual conference with The University of Hong Kong (HKU) Libraries in the hybrid mode at HKU Main Library on 16–18 June 2022. The conference theme was "Innovation and Transformation", and the subtitle was "the post-pandemic landscape of education and beyond".

Regarding the post-pandemic educational landscape, there are two stories to be told. On the one hand, some teachers and parents believe that the resumption of 100% face-to-face classes is long overdue. In the circumstances, schools and universities mandate COVID-19 vaccinations on the assumption that face-to-face teaching and learning on campus should take place as soon as possible. On the other hand, statistical data have shown that since the inception of the pandemic lockdown, there has been an exponential growth in the use and investment of education technology worldwide. The online learning global market is forecasted to rocket by 18 folds from HK$145.5 billion to HK$2,730 billion. The learning habits of billions of affected students across 186 countries have been forever changed. This is by no means just a temporary disruption, but a phenomenal digital transformation that is likely to stay indefinitely.

With the aim of providing a fuller picture of the post-pandemic landscape of education, communication and beyond, the HKAECT International Conference 2022 called for paper submissions and had received over 40 proposals from Asia, Australia, Europe, the UK and the USA. After the editorial and peer-review process, 18 high-quality manuscripts are chosen for the HKAECT Yearbook. The book consists of four parts under four main topics—Part One: Innovations in Language Learning and Teaching (five chapters), Part Two: Reflections on Online Learning and Teaching (five chapters), Part Three: Shaping a Positive Learning Environment (four chapters), and Part Four: Optimizing Digital Experiences (four chapters).

We are grateful to our keynote speakers, namely Dr. David Wiley, President of AECT, Dr. Roopika Risam, Associate Professor and Chair of Secondary and Higher Education at Salem State University in the USA, Professor Scott McLeod of The University of Colorado Denver in the USA, and Professor Agnes

Kukulska-Hulme of The Open University, the UK, for supporting our conference. Also, we are much obliged to the HKAECT International Advisory Board, the HKAECT International Programme Committee and all invited peer reviewers for helping us with the double-blind peer review. This book, *Innovation and Transformation*, represents an international endeavour to interpret the cultural phenomenon of education innovations, digital transitions and transformations in the new normal. It also signifies the fruitful collaboration between HKAECT and international scholars. Along with the interdisciplinary nature of various research projects discussed in the chapters, the edited volume provides a global perspective on ICT in teaching and learning, showing how technology and pedagogy change and develop among different cultures.

June 2022

Anna Wing Bo TSO
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Innovation in Language Learning and Teaching

Intelligent CALL: Individualizing Learning Using Natural Language Generation

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Abstract. This chapter describes the theoretical underpinning, development and evaluation of an online natural language generation app, the Question Generator. This app individualizes language learning by creating interrogative statements from declarative statements using a natural language generation pipeline, enabling learners to create their own individualized practice activities. Learners can discover inductively how negation and auxiliary verbs are used in questions. A classroom observation of learners using the web app was conducted with junior high school students and university sophomores. Both groups were engaged and stayed on task with minimum supervision. The individualization appeared to motivate learners as they input sentences that were of interest to them. Learners were observed to be particularly active when working in pairs. The Question Generator is the first online tool that enables learners to generate questions based on user input, and thus breaks new ground in the growing set of intelligent CALL tools.

Keywords: Computer-assisted language learning · Natural language generation · Interrogative statements · Question formation · Individualized learning · Discovery learning

1 Introduction

Teachers of English strive to meet the individual needs of learners. When teaching individuals or small groups, teachers are more able to tailor the lesson content and materials to meet the needs of each learner. However, providing tailored content becomes much more difficult as group size and group diversity increase. In mixed-level classes, class teachers may individualize materials by providing different content and/or different tasks to learners. This level of dedication is laudable, but it requires a significant time commitment from teachers.

The problem, in short, is how to personalize materials to suit the needs of each learner. This may involve providing the: (1) same content (e.g. a reading or listening text) with different tasks, (2) different content with the same task, or (3) different content and different tasks. All three options involve additional work by the materials developer. For paper-based materials, teachers most likely need to prepare and print the materials prior to class. However, for resources that are available online and open-access, teachers and students simply need access to a wifi-enabled device. The development of online

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resources that adapt to user needs and levels takes significant programming ability and an equally significant time cost. However, by harnessing resources that have been developed and deployed online, teachers and students can use them with little or no preparatory work.

The golden chalice of materials development is on-demand generation of individualized or personalized materials that meet the needs and expectations of learners. This involves creating a software program that can output personalized materials for each user. By harnessing natural language generation (NLG), materials may be created from user input. Using NLG provides more control over the language than using authentic texts. NLG software can pitch the materials generated accurately to the level of the learner based on the parameters and vocabulary sets specified in the software.

This chapter shows how natural language generation can be used to create materials related to the aims, level and interests of learners. An early prototype of a web-based NLG application, the Question Generator, serves as the vehicle to illustrate how NLG can be used to provide learners with relevant examples.

The remainder of this chapter is organized as follows. The importance of exposure to language and the necessity to notice specific language features are discussed in the following section. The trend to adopting more interactive and individualized learning approaches is then discussed in the subsequent section. The move from computer-assisted language learning (CALL) to intelligent CALL is described next. The focus is then narrowed to NLG, one domain within the broader field of natural language processing. Having established the theoretical underpinning for adopting NLG for pedagogic purposes, the Question Generator is then introduced in detail. The design, development and deployment of this online tool is described in a (relatively) non-technical manner. The method and results of the classroom observation of pilot testing with high school and university students are detailed. The extent to which the Question Generator meets the needs of the learners during the classroom observation is reported. The chapter finishes with a prediction that intelligent CALL is set to be a game-changer in materials development in the same way that online dictionaries and machine translation created a sea change in the way that language learners read and learn online.

2 Background

Children acquire fluency in the languages to which they are exposed. Krashen explains this using the concept of comprehensible input (Krashen 1982), asserting that vocabulary is acquired through reading (Krashen 1989). According to Piaget (1956), the breadth and depth of the language proficiency of children ranges widely depending on the types of interactions they are involved in. Likewise, adult language learners require exposure to learn a new language. Adults raised in monolingual environments with little interaction with speakers of the target language tend not to develop productive fluency. This is particularly true in countries, such as Russia and Japan, where there is little need or opportunity to use English in daily life. In short, exposure to input-rich language environments provides opportunities to learn the language; conversely, with no exposure, there is no opportunity to learn (Griffiths and Soruç 2018). The importance of exposure underpins the approaches in many language learning textbooks and second

language learning classrooms. Every classroom and every coursebook includes the target language even if rubrics and explanations are provided in a different language. A widely-used approach in second language teaching is for the teacher and/or the teaching materials to systematically expose learners to target language items, such as vocabulary sets or grammatical structures (Spratt et al. 2005). Nowadays, the target language items are commonly contextualized in textbooks using authentic and semi-authentic written texts (Little 2014).

When target language is presented in context, learners may be given comprehension questions to guide them to understand the gist of the whole text and specific meanings of key parts of the text (Hondo 2015). Despite skimming and scanning the text to answer the comprehension questions, learners may not have paid much attention to the target language itself. In communicative language teaching, learner attention is often drawn specifically to the target items by first focusing on its meaning, then its structural form, pronunciation and appropriacy of use (Isaacs 2009). Simply put, learners are guided to notice the target language. This noticing is said to give them the opportunity to learn the language. Consider how you would say *thank you* in a language that is extinct. Would you not have to see or hear it, before you could learn it? However, with some extinct languages there are no audio or textual records, and so these languages are destined to remain extinct. The noticing hypothesis proposed by Schmidt (1990) claims that noticing language features is a necessary precursor to learning the language features. In short, if learners are exposed to a particular language feature in context, but do not pay attention to that feature, the learners will not learn the language feature. However, if learners consciously notice the target feature, then there is the possibility that they may learn that feature. In a nutshell, failing to notice rules out learning. The noticing hypothesis has received criticism because of the lack of theoretical basis and the difficulty to test the hypothesis (Truscott 1998). Despite this, the day-to-day activities of many language teachers appear to focus learners on target features to help students learn those features.

If we accept the proposition that it is necessary to get learners to notice language features to help them learn or acquire those language features, then the dilemma for the teacher is how to get the learners to notice the target features most effectively and most efficiently. Most textbooks for language learning focus on the written form of language features. Even when a word or structure is presented in a listening text, students are frequently asked to examine the written transcript. For example, when helping learners understand how to formulate closed questions, learners need to be exposed to the various question forms. Students hearing (or reading) *"Are you okay?"* might be able to generalize the form to *"Are you ready?"* but may overgeneralize to *"Are you understand?"* if they failed to notice that the auxiliary verb *be* is used to create closed questions when the predicate is an adjective. Learners need to notice how different auxiliary and modal auxiliary verbs are used to be able to ask grammatically-correct questions with different main verbs in different tenses. This is usually systematically dealt with in course materials, often with the help of mainstream textbooks. Textbooks invariably introduce the more commonly-used tenses, such as *present simple* and *past simple* before the less-frequently used and more complex tenses, such as *past perfect* and *future progressive* (Aitken 2021).

3 Learning and the Individual

Textbooks used in language learning classrooms reflect the fashionable orthodoxies at the time of press (Harwood 2014). Many language schools base their curriculum on textbooks and many teachers base their classes on the approach and activities contained in the textbooks. Language teaching approaches and methods have changed over the years. Grammar translation dominated language learning for most of the last two millennia (Chang 2011). However, in the last century multiple new teaching approaches were introduced including direct method, audiolingual, communicative and post-communicative.

A general trend that can be identified among these approaches is the move from lockstep classroom teaching in grammar translation to a focus on interaction (Long and Porter 1985) in communicative and post-communicative approaches. Although learning can occur without teaching, and teaching can occur without learning; our hope as teachers is that there is some correlation between our teaching and student learning. In an effort to increase the amount of learning, students are encouraged to more actively participate. In language classes, active participation tends to be achieved by encouraging students to work together through the use of pairwork and groupwork. Teachers set students tasks or activities to work on with their partner(s). These tasks may be classed as information or communication gap activities (Nakahama et al. 2001). Language labs gained in popularity in the 1950s and 60s (Alexander 2007). Students in language labs tended to interact with audio materials, which often involved shadowing or responding to audio prompts (Hamada 2019). The use of technology in the language labs enabled learners to practise at different levels simply by selecting materials that were pitched at different levels. There was a strong movement to self-access centers in the 1980s and 90s, which again changed the type of interaction. Learners were now being encouraged to study autonomously without regular access to a teacher (Benson 2001). Although pairwork and groupwork is still encouraged, most learners availing themselves of these centers interact with online resources. The Centre for Independent Language Learning website[1] developed by Andy Morrall at Hong Kong Polytechnic University was one of the first online resources that provided learners with multiple client-side interactive activities.

Ubiquitous access to the internet, affordable wifi-enabled devices and a relatively tech-savvy generation of language learners who grew up playing online games, relying on search engines and checking social media sites has again altered the language learning technoscape (Appadurai 1996). The internet is a rich source of input with an infinite stream of reading and listening texts. Learners who need to check or look up information on grammar or the meanings of words are spoilt for choice.

The advent of intelligent CALL gives both teachers and learners the opportunity to generate their own practice materials on demand. This obviates the need for materials developers to produce a vast bank of materials from which materials for each individual learner can be selected. By combining the power of artificial intelligence with genre-specific templates based on corpus studies, tailormade texts can be generated on demand. Until now, texts have been categorized into the authentic or non-authentic

[1] Https://elc.polyu.edu.hk/cill/.

dichotomy; but perhaps the human-created or computer-created will become a more important dichotomy in years to come as the number of computer-created texts increases.

Students learning languages in classes tend to be grouped together by age and/or ability. In most cases, the whole class studies the same language points using the same material. For example, Japanese students attending junior high school are taught the same content in the same manner with the same material regardless of the interests and ability of each student. Japanese school students are relatively homogenous, having followed the same school curriculum taught using government-approved textbooks. Many classrooms worldwide have far lower levels of linguistic, cultural, and social homogeneity. Individualized learning is achieved by matching the content, mode and pace of learning to each learner. Although the Japanese junior high school students are likely to share the same mother tongue and many cultural values, each student has different learning styles, learning preferences, interests and language competences. Individualized learning aims to tailor learning to each learner profile. For example, materials may be offered at slightly different levels with learners able to self-select the level appropriate for themselves, which enables learning to be individualized based on language competence. In an attempt to cater to learning style preferences, learners may be provided with materials that reflect their preferences. To facilitate individualized learning, technology is often used. By harnessing both machine learning and computer-assisted language learning, learning may be personalized to each learner.

4 Intelligent CALL

Computer-assisted language learning (CALL) made inroads into the classroom in the 1980s, but took off in the 2000s. Nowadays, increasingly more language learners are using their mobile phones to access learning materials online. The increase in ownership of mobile devices and the ubiquity of wireless connections to the internet resulted in a new subdomain of research and practice, namely mobile-assisted language learning (Chinnery 2006). The mobile-first approach (Mullins 2015) in which web apps and webpages are designed first to function on the smaller viewport of mobile devices is now standard practice for website developers.

One of the domains gaining popularity recently under the umbrella of CALL is intelligent CALL (iCALL) (Volodina et al. 2012), which harnesses natural language processing for language learning purposes (Gamper and Knapp 2002). However, it should be noted that iCALL is over three decades old. A summary of the research and practices of iCALL was published back in the late 1980s (Bailin et al. 1989). However, the high cost of computers, limited access to the internet and the technological knowledge hurdle were barriers that hindered its transition to mainstream language learning. The combination of recent breakthroughs in machine learning combined with increasing accessibility to the internet are a driving force for iCALL.

Language learning applications harnessing iCALL have been created to help learners with pronunciation (Boitsova et al. 2018; Bogach et al. 2021; Qian et al. 2018), grammar (Ward et al. 2019; Purgina et al. 2020) and writing (Chukharev-Hudilainen 2019; Chukharev-Hudilainen and Saricaoglu 2016). All of these learning applications use natural language processing to search texts for patterns, but none of them uses natural language generation.

One natural language generation tool that is utilized in classrooms, but was not developed for language learning is a Conversational User Interface (CUI). There are two types of CUI: chatbots and voice assistants. The early version is the chatbot. Chatbots engage in conversations with humans (or other chatbots) by generating responses to declarative statements and answers to interrogative statements. Chatbots are designed to simulate human-like conversation using text messages and have been used in CALL (Wik and Hjalmarsson 2009). Chatbots use artificial intelligence when generating responses and answers. More recently, voice assistants communicate via voice user interfaces, such as Alexa (Amazon), Google assistant (Google) and Siri (Apple). Open access to natural language processing (NLP) platforms, such as Dialogflow (Google)[2], allow educators to tailor Conversational User Interfaces for language learning. Such CUIs can be designed using a combination of general modules offered by the platform and specific modules that relate to the needs of the learners. Voice-driven artificial intelligence assistants (e.g. Alexa) can be trained to interact with learners in a variety of contexts, which can provide language learners with valuable fluency practice (Dizon 2017; Dizon and Tang 2020). However, because of the nature of machine learning, it is difficult to understand how the speech is generated. Natural language generated by rule-based parsing is easier to control and can provide learners of English with practice activities tailored to their specific interests and needs.

Data-driven learning (Boulton 2017; Hadley 2002) is one way in which learners can be exposed to particular language features. The most common source of data is from a corpus (e.g. Braun 2007; Chujo et al. 2012) which may be accessed using a concordancer, such as the popular open-access free-of-charge downloadable AntConc (Anthony 2022) or via an online subscription platform, such as Sketch Engine (Kilgarriff et al. 2014).

A novel way to provide learners with data is by creating texts automatically using natural language generation (NLG) pipelines. According to McDonald (2010, p. 148), natural language generation started to flourish in the 1980s as a subfield of computational linguistics. One of the first types of NLG was the creation of random sentence generators, which were developed to check grammars.

There are two main approaches to NLG: rule-based and probabilistic (Blake 2020). With a rule-based approach the software developer has greater control over the syntax and lexis used in the generated text, which may help the developer pitch the level of the text to its target users more easily. With a probabilistic approach, machine learning is used and so the training data greatly impacts the generated text. Any biases or idiosyncrasies in the training data are likely to be reflected in the texts produced. The software developer has less control over the output produced by machine learning approaches. Machine learning, including deep learning, are so-called black box approaches, since it is not possible to see or understand exactly how the system works (Rubin 2019).

Language awareness raising activities help learners notice linguistic features. The practices of many language teachers are founded on the principle that noticing is a precursor to learning (Ellis and Mifka-Profozic 2013). NLG is a scalable method to provide controlled individualized practice that help language learners notice language features. NLG for language learning is a relatively new innovation. This nascent application of pedagogic NLG is firmly situated on the cutting-edge of intelligent CALL.

[2] Https://cloud.google.com/dialogflow/docs/.

5 Question Generator

The inspiration for this tool stemmed from a controlled practice activity used in English language classrooms, in which learners create as many questions as possible based on a given sentence. This allows students the choice of selecting which question to ask, yet given the limited number of choices, teachers can anticipate the types of mistakes that learners make. For example, using the input sentence in (1) and limiting the question types to open questions, two different types of questions (i.e. subject and predicate) may be asked. Subject questions involve replacing the grammatical subject with an interrogative pronoun, while predicate (or object) questions use inversion and require an appropriate auxiliary verb.

(1) I woke up on the sofa at seven o'clock this morning.

Students can select from four different interrogative pronouns (i.e. who, where, what and when) to create questions such as those shown in examples (2) to (5).

(2) Who woke up on the sofa at seven o'clock this morning?
(3) Where did you wake up at seven o'clock this morning?
(4) What time did you wake up on the sofa this morning?
(5) When did you wake up on the sofa at seven o'clock?

Examples (6) to (9) show some of the common mistakes made by Japanese learners of English. In example (6) the tense of the main verb should be past simple and not present simple. In example (7) the auxiliary verb *did* is omitted. Tense is a problem again in example (8) as both the auxiliary and main verb carry past tense. The auxiliary continues to cause problems in example (9), but this time the issue is using the incorrect auxiliary verb and incorrect tense.

(6) Who wake up on the sofa?
(7) Where you wake up this morning?
(8) What time did you woke up on the sofa this morning?
(9) When are you wake up on the sofa this morning?

Practice activities like this can be personalized by allowing learners to supply the initial statement. This provides learners with the freedom to select the topic, length and complexity of the declarative statement, which in turn affects the questions.

All question types present challenges for learners of English. The three main question forms are open-ended, closed-ended and tag questions. Open-ended questions can be subdivided into questions that ask about the subject or the predicate, each of which adhere to different grammatical rules. Many learners of English struggle to create grammatically accurate questions. There are numerous reasons for this, including the necessity to manipulate the syntax of a declarative statement into the appropriate form for an interrogative statement. Different types of verbs (e.g. stative, dynamic) behave in different manners. Tense, voice, aspect and modality of the finite verb phrase affect the syntax used in questions.

Prototype proof-of-concept natural language generation tools were created by computer science majors in the University of Aizu enrolled in a credit-bearing elective course

on computational linguistics. The course followed a Content and Language Integrated Learning (CLIL) approach with the two-fold aim of developing both content knowledge and language proficiency. In terms of content, learners were required to analyze linguistic patterns occurring in different language systems (e.g. phonemic, syntactic) and master powerful search expressions used in programming called regular expressions. A number of prototype web apps were created. These including a trend description generator, a closed question responder and a very basic question generator. The trend description generator automatically creates a descriptive text from data values, which may also be used to create a graph or bar chart. The closed question responder provides positive and negative short answers to any closed question. A number of initial question generators were created, each of which focused on one type of question. These prototypes informed the development of a more sophisticated question generator that is the focus of this section.

Having established the feasibility of turning the inspiration of a question generation tool into a web application, the next step was to create a high-fidelity prototype to help Japanese learners of English learn the form of various question types by providing unlimited examples.

The Question Generator is the first release of a natural language generation web app. A technical description of the design and development of the Question Generator is available in Vu and Blake (2021). Although many NLP researchers work on problems related to question answering, almost all focus on extracting answers to questions from texts. However, this intelligent CALL tool generates questions rather than answers. Although there is a substantial amount of research on question generation presented at top-tier computational linguistics conferences, there is a lack of operational deployments. Apart from releases from our laboratory, no online question generation tools were discovered at the time of writing. An extensive search of the literature revealed no reports of any system specifically created to generate questions based on an input sentence for language learning purposes. Systems that rely heavily on neural networks to create sentences may provide authentic examples, but the complexity and vocabulary of the generated questions is not graded to the level of the input sentence, potentially making the questions too difficult to understand. The Question Generator therefore breaks new ground by being the first online tool to generate questions from user input to help learners of English.

The Question Generator creates interrogative statements from declarative statements using natural language generation. This is achieved through an extensive set of transformation rules supplemented by machine learning to generate appropriate questions. This system enables learners to create their own individualized controlled practice activities. Learners can input a sentence and the web app automatically generates three types of questions: closed-ended, open-ended and tag.

By comparing the input and output, learners can raise their language awareness of syntax either inductively or deductively (Shaffer 1989). For example, through interacting with the web app, learners can discover how negation and auxiliary verbs are used in tag questions, and induce the rules that govern the syntax. When used deductively, learners can create questions based on an input sentence, and then compare the questions that they have created with those created by the Question Generator. They can then analyze and evaluate differences between the questions to determine which (if any) are inaccurate.

To use this web app, users simply need to navigate to the website, input a declarative statement and select the required question type. Learners can select to generate closed-ended, open-ended and/or tag questions. Figure 1 shows a screenshot of the graphical user interface of the web app for a very short simple sentence taken from the popular coursebook Headway Beginner.

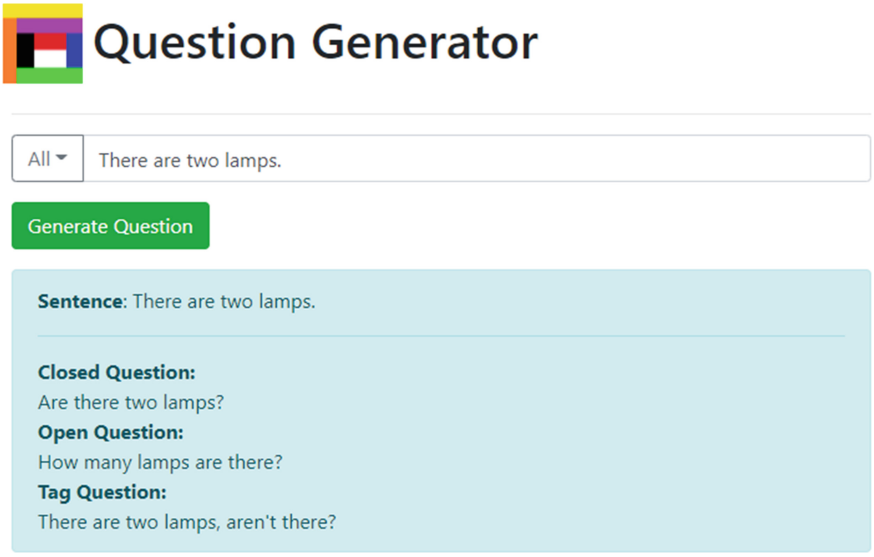

Fig. 1. Screenshot of the output for "There are two lamps."

Figure 2 shows how the Question Generator deals with a slightly more complex sentence. In this case, the grammatical subject comprises two entities, namely Mary and Tom. This needs to be resolved to the plural pronoun *they* to create a tag question.

Figure 3 shows the result for a simple sentence that contains multiple adverbials.

In addition to the necessity to identify time and location adverbials in order to determine the most appropriate interrogative pronoun, the fronting of the time adverbial *Next week* poses another challenge. In the question forms, time adverbials are usually placed at the end of the clause rather than before the interrogative pronoun. However, it should be noted that in the third open question, a rather formal and marked question is generated due to the fronting of the prepositional phrase *From Canada.* A more appropriate question form would be: *Where will my aunt be flying to next week?*

Automatic question generation is technically challenging for a number of reasons. Two particularly notable issues were the selection of syntax and pronouns (interrogative and personal). The primary substantial challenge is to be able to create the correct syntax for the question form being constructed. Transformation rules were created to map each of the three question forms to generic text inputs. A detailed and rather technical explanation of the way in which transformation rules are applied is given in Vu and Blake (2021). The transformation from declarative to interrogative statement is exacerbated by

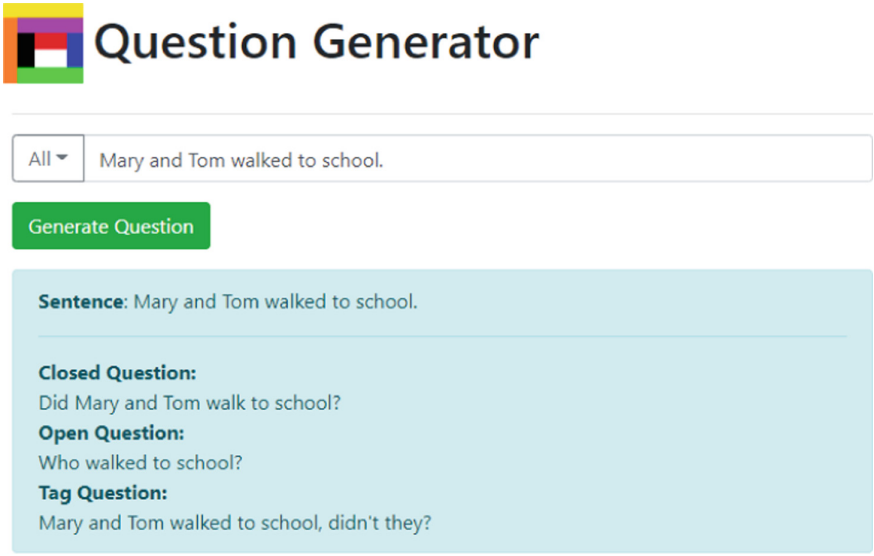

Fig. 2. Screenshot of the output for "Mary and Tom walked to school."

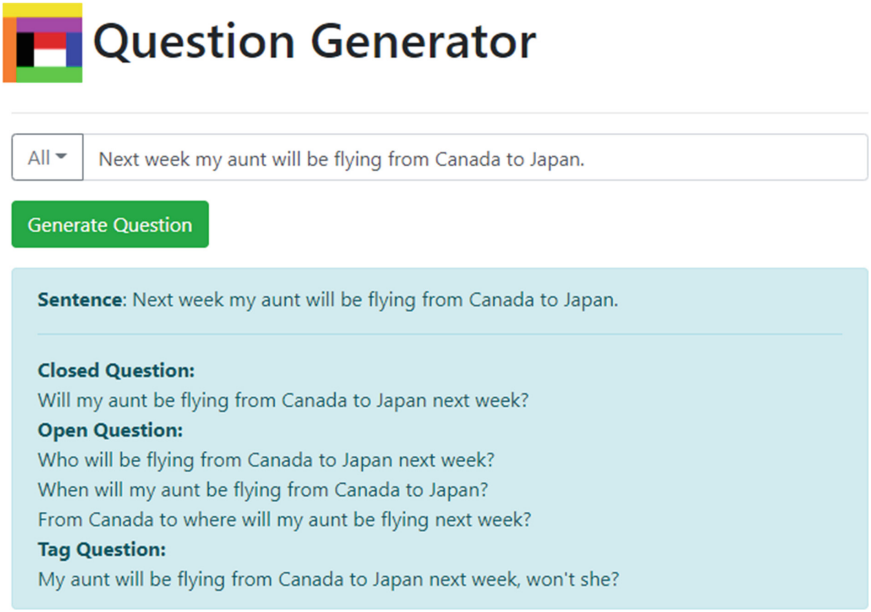

Fig. 3. Screenshot of the output for "Next week my aunt will be flying from Canada to Japan."

having to deal with tense, voice and aspect, each of which impacts the form of the question. The automatic selection of appropriate interrogative pronouns is also problematic. There is a plethora of research on pronoun resolution, in which the pronoun is mapped to

the entity it represents. However, there is a paucity of research on pronoun generation in which entities are mapped to pronouns. In the English language classroom, teachers can provide general guidelines to learners to select appropriate interrogative pronouns, such as to use *where* for places, *who* for people and *what* for things. Students are generally able to differentiate between places, people and things. However, for software, words are just a series of letters, referred to as a string. In order for the software to classify strings as places, people or things, a combination of extensive lists and machine learning is needed. To provide an example of the complexity of the task, a three of the many rules are given below.

(10) When the head word of an adverbial phrase is on the adverbs of time list, use *when.*
(11) When the head word of a noun phrase is an entity of the type geo-political, use *where.*
(12) When the distance from the head word vector to the vector human in the semantic space is less than the distance to the vector object, use *who.*

The rule shown in (10) is straightforward and may be thought of in practical terms as when expressions like *yesterday* and *last month* are used, questions using *when* are created. The rule in (11) means that the pronoun *where* is assigned when names of regions, such as Ohio, the United States and the Himalayas are detected. The rule shown in (12) is rather complex, but involves predicting the likelihood that the head word is human using machine learning. The accuracy rate of the interrogative pronoun selection is highest when based on the presence of a single word or phrase, lower when based on identification of entity type and the lowest when based on the decision of a machine learning classifier.

When creating open or closed questions, there is no need to replace entities with pronouns, but in order to create sentence tags, the pronoun for the grammatical subject needs to be determined. This raises a number of issues that need to be overcome. The number of a noun needs to be established so plural nouns may be assigned the pronoun *they*. This was achieved in part by handcrafting subject-pronoun rules based the noun phrases (NPs) and subject-verb agreement.

In cases where the subject is a proper noun, named entity recognition is used to identify names used for people. Machine learning is harnessed to classify given names by gender based on a training set of 7000 Western names and 500 Japanese names. Other proper nouns that are not categorized as names of people and then compared for gender based on an extensive list of genderized nouns. Common nouns are classified using a complex algorithm harnessing word embedding, semantic representation and machine learning (see Vu and Blake 2021 for more details).

6 Classroom Observation of Pilot Testing

Pilot testing is used to verify whether a software program or system works under typical operating conditions. Generally, a group of real-world end users are asked to try out a program or system (Rossett and Schafer 2012). In our case, we also observed participants using the web app. The Question Generator was trialed during the development period

with small focus groups of students known to the developers. The purpose of these focus groups was to enhance the usability of the tool by observing how learners interact with the tool with the view to improving the user interface and user experience. However, to get a fuller picture of whether the web app meets user needs, two different age groups of users were observed using the Question Generator. The first was a cohort of junior high school children (n = 30; male = 14; mean age = 15, CEFR[3] = A1) and the second was a class of university sophomores (n = 48; male = 44; mean age = 20, CEFR = A2 and B1), majoring in computer science and engineering. Each focus group of between 6 and 10 spent one teaching period (50 min) to try out the Question Generator, and share their feedback. There were two prepared questions for each focus group:

1. What did you like or dislike about the Question Generator?
2. How can we improve it?

To draw out more information for the participants, probing and clarification questions were asked to gain a better understanding of what we should improve in the next release.

During the classroom observation, the learners accessed the Question Generator via either a desktop computer installed in the language laboratory in which the study was being conducted or via their own wifi-enabled device. The junior high school children shared workstations and worked in pairs. The university students were given the option to work alone or in pairs. Around half of the university students opted to work in pairs while the remaining students worked individually.

Both the junior high school students and university students appeared to be engaged and on task during the study period. The class teacher introduced the Question Generator in a similar manner in both studies by showing how to access the web app. Students worked with minimum supervision in both studies.

Despite the differences in the number of years having studied English, both groups had difficulty formulating syntactically correct questions in English. This web app thus meets a need in terms of appropriacy of content as both school-age students and university learners struggled at times to create grammatically-accurate questions for the input sentences. Both groups had a reasonable mastery of commonly taught and highly frequent question forms, such as: *"What is your name? What time is it? Can you help me?",* but struggled with longer question forms.

The usage of the web app differed slightly between the two cohorts of students. The schoolchildren entered shorter sentences on more concrete topics, such as "I went to school yesterday" while university learners entered more complex and more abstract sentences, many of which were copied from online sources. The junior high school students tended to input sentences that they created related to their interests but also input sentences that were copied from their English textbooks.

The tutor noted that in both groups learners were particularly active when working in pairs on one monitor. This may be due to increased opportunity for interaction and the students desire to or willingness to communicate with their classmate. However, this dynamic is unlikely to be directly related to the web app itself.

[3] Common European Framework of Reference for Languages.

The individualization appeared to motivate learners as they were able to input sentences that were of interest to them. Participants in both classroom observations smiled and joked while entering statements for the Question Generator. Although enjoyment may not correlate directly to learning, students are likely to spend more time on tasks that are enjoyable (Fielding 2020). The ability to choose topics, vocabulary and grammatical structures gave learners a wide range of autonomy and added the possibility for them to energize their learning. The junior high school students, in particular, appeared to draw on in-jokes when entering statements. Although both groups in this study were courteous; with less well-behaved groups, it could be necessary for teachers to check that learners are not inputting statements portraying their peers in a negative light.

Based on feedback from the learners, a colorization feature is planned. Different colours may be used for words based on whether or not the words are present or absent in the original statement, or their form has been altered. When implemented this feature can help learners understand which elements in the question are borrowed, altered or not present in the original declarative statement.

7 Conclusion

Using NLG enables users to create language learning materials on demand based on user input. This obliviates the need to prepare inordinate amounts of materials to meet the needs of learners. The generation of single statements for pedagogic purposes is already possible as the Question Generator has shown. Although many genres of writing, including scientific research articles, have been automatically generated using NLG, none of these controlled the language based on sophistication and suitability for language learning. Other natural language generation tools currently under development, such as the trend description generator, involve the generation of a paragraph that serves as a prototypical example of this text type. This type of language generation has to be based on insights gained from specialist corpora to ensure the appropriacy of the rhetorical organisation and lexical realization.

Natural language generation simplifies the process of individualizing materials for language learners as the decisions and parameters are built into the software prior to the materials being created. By utilizing existing libraries and lexical lists, texts can be individualized to learners. In the case of the Question Generator, learners determine the content of the question by inputting a prompt sentence whereas in the trend description generator, learners input or select data values (e.g. time periods and numerical values) that can be used to create a graph or bar chart, and concomitantly an accompanying textual description of the visual. Future tools could ask users to input details regarding various parameters, such as language level, learning styles and preferences. These details may be used to inform the mode, manner and medium of texts generated.

The Question Generator is the first online pedagogic tool that enables learners to generate questions based on user input, and thus breaks new ground in the growing set of intelligent CALL tools. However, the selection of an appropriate hosting platform needs to be ironed out before this is released for general use. There are currently three versions of this software, each with slightly different levels of accuracy. The version with the lowest accuracy is deployed on a free plan on Heroku, which is a platform

that allows developers to run applications in the cloud. Although this is free, access is limited and once the threshold is reached, the web app is not accessible. In this version few machine learning functions are integrated to reduce the processing time. The second most accurate version is deployed on a pay-for-use platform, Amazon Web Services (AWS). The running costs, however, rise substantially as the number of users increases. More machine learning functions are included, which results in higher accuracy than for the free version on Heroku. The most accurate version runs offline, and is able to use machine learning with a time delay of only a few seconds. Thus, our current dilemma is the trade-off between running cost and performance. Two ways under consideration to support the running costs of the web app are using an advertising model and/or a subscription model for regular users, which could allow guest visitors to use the web app free of charge.

Although natural language processing pipelines can generate language (questions in our case) on demand, sharing such pipelines with a wider audience is a challenge. Intelligent CALL is set to radically impact online language learning, but the true power of iCALL will probably only be available once a suitable hosting platform model has been created. Video sharing platforms, such as YouTube, were a game changer for video creators. Let's hope that an entrepreneur sets up a similar such platform for iCALL tool developers to share their creations freely.

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Teaching Shakespeare to EFL Students Through Transmedia

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Abstract. Despite the fact that Shakespearean drama has always been core to English literature and cultural studies worldwide, the original plays, which were written over 400 years ago during English Renaissance in the Elizabethan Period, can be remote from the current reader's everyday life experience. Fortunately, with the advancement of digital technology, the works of Shakespeare have been revived, celebrated and embraced in the transmedia reading environments. With a view to investigating how "transmedia" (Jenkins 2009) can be used for teaching and learning Shakespeare, from September 2020 to December 2021, the author carried out a comparative study between the class that studied only the original Shakespearean plays, and the class that learnt Shakespeare through a combination of original plays and transmedia texts. Through students' end-of-term evaluation, academic performance, the survey and the focus group interview, it is found that the use of transmedia can significantly enhance students' learning experiences and academic performance. With reference to the findings, this paper also shares the author's first-hand experiences of using transmedia texts when teaching Shakespeare online during the pandemic, and suggests how the transmedia environment may open up new possibilities for teaching and learning at the tertiary level.

Keywords: Shakespeare · Transmedia · Higher education · Popular culture · Prosumers

1 Teaching with Transmedia at University

As defined by Henry Jenkins (2007), Professor of Communication, Journalism and Cinematic Art at The University of Southern California (USC), transmedia storytelling is the art of forming a universe of multiple narratives across various digital and non-digital media which include books, blogs, vlogs, games, film, drama, theatre, comics, television, and animation (Jenkins 2007). Unlike multimedia, which may only provide the same single contribution to a story, transmedia offers poly-narratives through different media all in one go (Jenkins 2011). What is noticeable about these parallel, self-contained micro-narratives under the same transmedia universe is that they are not led by the mainstream mass media (Scolari 2009). Rather, any reader, viewer, and user can contribute to the world-making process, become the prosumer who creates contents in the participatory culture, dramaitzing narrative and worldviews just as "the way social-networking sites

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may help the oppressed to participate in reforming corrupt dictatorships" (Gilardi and Reid 2014, pp. 114–115).

With the rise of popularity of transmedia narratives, transliteracy has become a new mode of literacy in the higher education sector. According to Reynolds (2011), transliteracy refers to "literature that crosses between media and is no longer exclusively text-based" (p. 64). In the digital era, university students and graduates are not only required to master academic literacy skills through grammar drilling and mechanical skills training, (Tso and Chung 2016) they are also expected to show a reasonably high level of transliteracy, namely the ability to access and read "source texts (book or movie), parallel stories (adaptations), and satellite stories (computer games), and then contribute to creating user generated content (fan fiction)" (Gilardi and Reid 2014, p. 114). A keen transmedia reader is expected to be "accustomed to: interactivity, networks, screen fragmentation, more rapid presentation, rapid adaptation to new interfaces, intertexuality, and multi-screens" (Pence 2012, p. 7). Likewise, university teachers are expected to use transmedia as a teaching tool in their classroom. The key to success in teaching with transmedia are as follows: first, in addition to the primary reading texts (e.g. the original plays written by Shakespeare), the teacher should learn to appreciate the transmedia as democratic narratives in both the physical and virtual worlds, which can be fluid and fragmented. Secondly, teachers must view transmedia as a healthy medium that "expands the number of media channels for student learning" (Pence 2012, p. 7). When introduced effectively, transmedia as a pedagogical approach can bring in freedom and allow room for exercising creativity in class.

2 Purpose of the Paper

To explore whether transmedia can be used as an effective pedagogical tool for teaching English literature to EFL students at university, this paper used an advanced literature course titled *Shakespeare and His Universal Themes* as an example to test and show the effect of using transmedia in teaching Shakespeare. The qualitative and quantitative findings collected from student surveys, the end-of-year course evaluation, course grades, and interviews shall shed light on how Shakespearean drama, with the help of transmedia, can arouse EFL students' reading interest, foster art appreciation, encourage creative writing, and cultivate peer interactions. Besides discussing the research findings, the second part of the paper will also share the author's personal experiences of using transmedia as an educational tool to teach Shakespearean drama to undergraduate students in Hong Kong. Interesting hands-on pre-reading, while-reading, and post-reading transmedia materials and activities for teaching *Romeo and Juliet* (first performed in 1595), *The Tragedy of Julius Caesar* (first performed in 1599), *Othello* (first performed in 1604), *The Merchant of Venice* (first performed in 1605), and/or *King Lear* (first performed in 1606), will be introduced respectively.

3 Research Questions

In this case study, there are three research questions:

1. How did EFL students perceive the use of transmedia in the Shakespeare class?
2. Did the use of transmedia in class enhance students' learning and improve their academic performance?
3. If transmedia can enhance university students' learning, how may transmedia be introduced to teach Shakespeare at a university setting?

4 Research Methodology

With a view to examining the effectiveness of using transmedia in teaching Shakespeare to EFL students at the university level, this case study compared the students' perception, learning motivation, and academic performances of two groups of EFL English majors studying Shakespeare. In the control group, the student participants took the compulsory course titled "Shakespeare and His Universal Theme" in September 2020–December 2020 (semester 1 of 2020–2021), a time when Hong Kong was under the influence of the pandemic. Students of the course were allowed the freedom to choose for themselves whether they wanted to attend the lectures face-to-face in the campus, or online synchronously via Zoom. Seventeen (n = 17) male students and thirty-two (n = 32) female students aged 19–21 took part in the study. All student participants were encouraged to read and study five original Shakespearean plays before having the Shakespeare class. In the lectures, both the original plays written in early modern English and the modern English translation were referred to, but the lecturer did not introduce transmedia texts for pre-reading, while-reading, and post-reading. During the lectures, students in the control group were given a book chapter which introduces London's Globe Theatre in week 1. Then, in-class activities, students studied the most famous Shakespearean quotes in week 2, read excerpts of *Romeo and Juliet* in week 3, discussed the modern English version of *The Merchant of Venice* in week 5, acted out key scenes from *Othello* in week 6, wrote reviews on *King Lear* in week 9, and made comparison between Shakespeare's *The Tragedy of Julius Caesar* and the biography of Julius Caesar in week 11. At the end of the course, students were asked to fill in the student evaluation questionnaire to provide their feedback on the course content, and their overall learning experiences during the Shakespeare course. The course scores of the control group participants were also collected, in which 30% was from the mid-term paper submitted in week 7, and 40% was from the final paper submitted in week 14.

Similar to the control group, the experimental group also consisted of EFL student participants who took "Shakespeare and His Universal Theme", but the course was delivered in September 2021–December 2021 (semester 1 of 2021–2022) instead. As in 2020, the autumn semester in 2021 was affected by COVID-19 as well. Students were thus given the liberty to decide for themselves whether they wanted to return to campus and take the face-to-face lectures, or that they should stay home and have the online Zoom lectures, which were conducted synchronously to the face-to-face lectures. Twenty-three (n = 23) male students and forty-nine (n = 49) female students aged 19–22 took part in the experimental group. Different from the arrangement for the control group, student participants of the experimental group were provided with a variety of multimodal texts while they studied the five original Shakespearean plays. During the lectures, students in the experimental group had a virtual visit at the Globe Theatre in

London via the 3D simulated website in week 1. Students also had a chance to chat with AI Shakespeare online in week 2, read the manga version of *Romeo and Juliet* in week 3, and watched the film version of *The Merchant of Venice* in week 5, the animated version of *Othello* in week 6, Kurosawa's Japanese film adaptation of *King Lear* in week 9, and the Royal Shakespeare Company's recorded stage performance of *The Tragedy of Julius Caesar* in week 11. By and large, transmedia texts were used and highly recommended for pre-reading, while-reading, and post-reading. In the middle of the semester, the experimental group were invited to fill in a survey about their view on the use of transmedia for teaching Shakespeare. The participants' digital literary practices, learning habits, and overall perceptions towards learning Shakespeare via transmedia were collected. In week 14, students of the experimental group were again asked to give their feedback on the Shakespeare course through the end-of-term student evaluation questionnaire. Questions regarding the use of transmedia and its effectiveness were asked:

1. Is it useful to learn Shakespeare using transmedia resources?
2. To what extent should transmedia be used in the course?
3. What type of transmedia do you prefer most?
4. What type of transmedia works best in the lectures?
5. What type of transmedia works best beyond the classroom?

Also, four participants from the experimental group joined the focus interview voluntarily to provide further detailed comments on their experiences of using transmedia as a learning tool in the Shakespeare class. Last but not least, the experimental group's students' course scores were collected. The course assessment rubrics and weighting were the same as those in the control group.

5 Research Findings and Discussion

5.1 Students' Perception of Using Transmedia to Study Shakespeare

Among the forty-nine (n = 49) control group participants and seventy-two (n = 72) experimental group participants, a hundred and sixteen (n = 117) were Chinese students, five (n = 4) were South Asians, none were native English speakers, and all of them were full-time students studying in Hong Kong. The majority (96.69%; n = 117) was native Cantonese speakers being brought up in Hong Kong, and only 3.31% of the participants were native Mandarin speakers originally from Mainland China. Furthermore, in the control group, 100% of the students were English majors, whereas in the experimental group, over 94% (n = 68) of the participants were English majors who had reasonably good standards of English. Only one student majored in Chinese and three students majored in business.

In week 7, participants of the experimental group were asked to fill in a survey about their perception of the use of transmedia texts in the Shakespeare class through a questionnaire. All participants but one agreed that it is useful to learn Shakespeare using transmedia (Fig. 1):

	Strongly agree	Agree, but only in face-to-face class.	Agree, but only when I study offline.	Disagree	Strongly disagree. Only the traditional plays should be used.
Percentage	68.06%	19.44%	11.11%	1.39%	0%
(Student no.)	(n = 49)	(n = 14)	(n = 8)	(n = 1)	(n = 0)

Fig. 1. EFL students' feedback when being asked whether it is useful to learn Shakespeare using transmedia resources.

While over 98% of the students in the experimental group welcomed the use of transmedia in the Shakespeare class, they had shown different preferences for transmedia texts (Fig. 2).

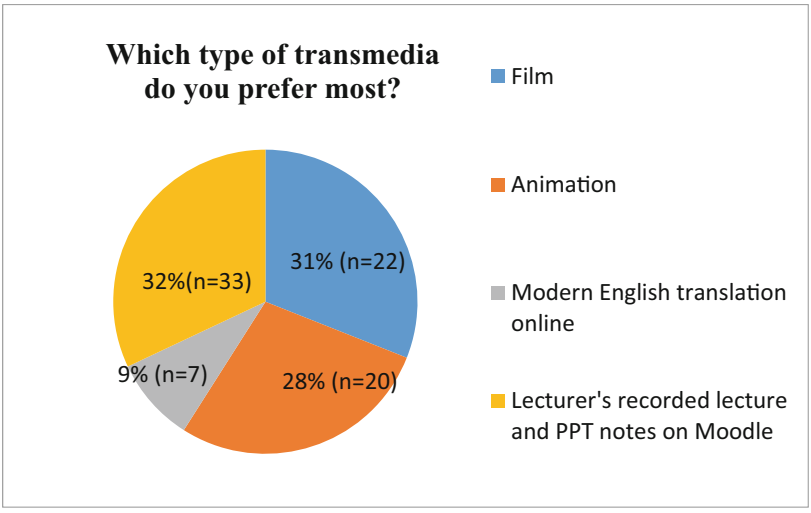

Fig. 2. The type of transmedia that students preferred most

From the students' preference, it can be seen that most students found transmedia to be most useful and user-friendly when they are in the visual mode. Only 7 out of 72 participants found the modern English translation online effective as they were reading the original plays by Shakespeare. This reflects that compared to printed texts, students were more attracted to films, animations, and recorded videos, regardless of whether these transmedia texts were used in class or at home.

Apart from the survey conducted in week 7, in week 14, four members of the experimental group were invited to share their views on how transmedia can enhance their learning experiences. The inverviewees' opinions were, to a large extent, in line with the survey result (Fig. 3):

Feedback 1 (The theatre's 3D virtual tour was informative.)	"Transmedia resources such as the 3D virtual tour inside the Globe Theatre in London can provide much more background information about the stage setting of Shakespeare drama. I didn't know the Globe Theatre has an open ceiling until I had the virtual visit."
Feedback 2 (The animated version of the play was useful.)	"It took me a great deal of time to read through Shakespeare's original plays. To get a quick overview of what the plays are about, I think watching the 20-minute animation version is the best. It may be the easiest and fastest way to gain a basic understanding of the plot, characterization, and themes of the plays."
Feedback 3 (The recorded lecture archive was helpful.)	"I find the archive of recorded lectures on Moodle neat and user-friendly. I can fast-forward the clips and replay the explanation I need at my own pace."
Feedback 4 (The modern translation online was convenient.)	"What is great about the modern English translation online is that it allows the user to search the exact act, scene and line number of a quotation excerpted from a play."

Fig. 3. The focus group's feedback on studying Shakespeare with transmedia

5.2 Student Satisfaction in Learning Shakespeare in the Control Group and the Experimental Group

Besides findings from the student survey and the focus group interview, responses from the end-of-course student evaluation questionnaire are also revealing. The Shakespeare class taught without the use of transmedia (the control group) was given an overall teaching evaluation score of 5.4 out of 6 in December 2020, whereas the class taught with transmedia (the experimental group) was given 5.5 in December 2021. More significantly, with the use of transmedia in the Shakespeare class, 100% of the students from the experimental group agreed that "the learning materials were useful to my studies" and "the learning activities stimulated my interest in the module". Surprisingly, a number of students also reflected that they actually enjoyed the class, even though Shakespeare's plays can be difficult to understand (Fig. 4):

Feedback 1 (Interaction enhanced)	"This module taught me so much about Shakespeare and the old days in a fun and interactive way."
Feedback 2 (Learning satisfaction rasied)	"I am satisfied with the teaching."
Feedback 3 (Enjoyability improved)	"I really enjoy attending the lectures."

Fig. 4. The experimental group's feedback collected from the end-of-course student evaluation questionnaire in December 2021

In contrast, in the class that studied Shakespearean drama without reference to any transmedia resources, 3.2% of the students from the control group disagreed that the learning materials were useful; 6.4% of the students disagreed that the learning activities stimulated their interest towards the Shakespeare course. Apparently, students who learnt with transmedia in the lectures were more satisfied with the Shakespeare course. The use of transmedia has enhanced students' perception of Shakespeare, even though the original plays are written in early modern English, which can be hard for students to digest. It is highly likely that learning with transmedia improves EFL students' understanding and appreciation of Shakespearean drama.

5.3 Academic Performances in the Control Group and the Experimental Group

The course scores and grades of the control group and the experimental group have also indicated that learning Shakespeare with transmedia is more effective. Having compared the average course scores obtained by the control group and the experimental group, we can observe an obvious positive correlation between learning with transmedia and students' academic performances. Most noticeably, the average score obtained by the control group was 69.50, but the average score obtained by the experimental group was 80.43, which shows a difference of almost 11 scores.

The grade distribution of the two Shakespeare classes also shows that the academic performance of the experimental group was better than that of the control group—only 2% of the students who learnt without transmedia managed to obtain grade A, but with the use of transmedia, the number of students who obtained the same grade was over six fold (i.e., 12.5%). Likewise, 22.4% of the students in the control group obtained grade C, and 8.2% even failed the course. However, only 2.8% of the students in the experimental group obtained grade C, and none had failed the course. The figures suggest that the use of transmedia can indeed enhance the EFL students' learning experiences (Fig. 5).

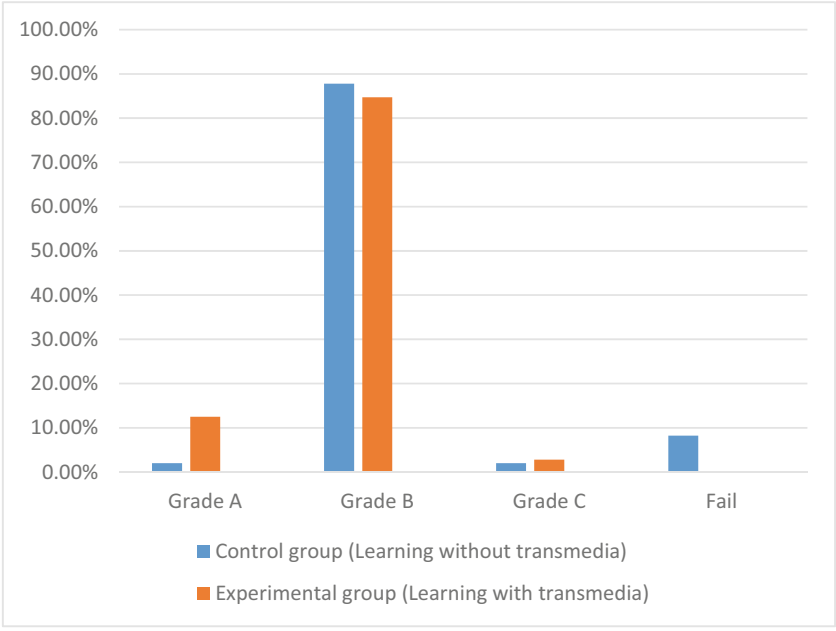

Fig. 5. A comparison of the grade distribution in the control and experimental groups

With regard to the above findings about how transmedia could significantly improve students' learning perception, student satisfaction, and academic performances even in an advanced literature course at university, we can conclude that the use of transmedia in the classroom and beyond is worthy of our attention.

6 Conclusion and Recommendations

Starting from the end of 2019, COVID-19 has been disrupting the conventional face-to-face teaching and learning practice at university. In semester 1 of 2020–2021 and semester 1 of 2021–2022, most universities in Hong Kong conducted classes through the blended learning mode. While it was up to the students to choose whether to have lectures online or face-to-face on campus, over 90% of the students in both the control and experimental groups chose to attend the Shakespeare course online. Due to the limitation of Zoom and other similar apps such as MS Teams and Google Classroom, peer interactions and teacher-students interaction has been largely reduced. It is also highly likely that students' learning motivation and attention towards the lessons have been negatively affected. For many teachers, delivering a lecture towards the computer screen for three consecutive hours without being able to see the faces and instant reactions of the students can be an uncanny and uncomfortable experience. Likewise, for students, having in-class discussions online may not be as natural and engaging as those conducted face-to-face in the lecture room, not to mention the background noises and frequent Wi-Fi disconnection at students' home.

Nonetheless, despite the multiple obstacles and contraints of teaching online in times of the pandemic crisis, teachers have all made attempts to digitize teaching approaches. As Damşa, Langford, Uehara and Scherer (2021) have noticed, the "pandemic-related lockdown accelerated the digitalization of education and forced teachers to adjust their teaching" (p. 1). Now that both teachers and students are used to the digital transformation in class, we can predict that coming soon in the post-pandemic era, teaching and learning with transmedia shall become the mainstream. In the face of the rising need for new literacy skills, the "conventional teaching mode in classrooms falls short in facilitating most of the new skills" (Tso and Lau 2018, p. 144). Even for a traditional undergraduate course like "Shakespeare and His Universal Themes", it will be sensible to teach by making good use of transmedia tools "such as film clips, audio clips, image projections, as well as interactive devices such as games, apps, and social networks" (Tso and Lau 2018, p. 179). A mixed teaching approach using both original plays and transmedia resources will become the new pedagogical norm. In the following, I will share my first-hand experiences of how Shakespeare can be taught with transmedia in the blended and/or online learning setting:

a. "Schedma activation via pre-reading activities" (Tso 2017, p. 143): because the original Shakespearean plays were written in early modern English, which is quite different from the English that we use today, the key is to attract students's attention first, and then arouse their learning interest. At the beginning of the lecture, the teacher can share a few popular, humourous and playful transmedia texts related to the class, be they memes about Shakespeare, brief quotations from the plays, or a wacky Youtube clip that provides a quick summary of the selected play. If students like the transmedia pre-reading materials, they will also share them on such social media platforms as the official Facebook, Twitter, and/or Instagram accounts of the English Department, thus constructing numerous transmedia spaces for students to share and interact with one another.

b. Visualization and recitation via while-reading activities: it is a common practice for teachers to invite students to recite power lines from Shakespearean drama and develop a dramatic duologue in class. Yet, before students can master the prononciation and recite meaningfully the chosen scenes in the format of a reader's theatre, the teacher can show the relevant chosen acts and scenes from a recorded stage performance or film adaptation of the same play. With subtitles in the video and the teacher's explanations on the professional actors' performance and recitation, students will be able to recite the lines with emotions. They will become "more alert to repetition patterns and the variety of sentence lengths and structures in Shakespeare's dialogues and monologues" (Tso 2016, p. 22). With the permission of the students, the reader's theatre conducted in class can be recorded and shared on a reliable, closed-group online learning platform (Kajornboon 2013) run by the university.
c. Innovative transmedia adaptations via post-reading activities: what makes Shakespeare "continue to be relevant and important to our education today", as Heim states (2016, p. xxi), is the creative play adaptations which evolve across time and cultures. For instance, in the 1980s, an "abundance of Chinese opera adaptations of Shakespeare" (Heim 2016, p. xxi) can be observed. In the digital age, numerous transmedia adaptations have come into play and become a part of popular culture, especially during the pandemic. To encourage creativity at the post-reading phase, the teacher can share interesting transmedia adaptations or parallel stories of Shakespearean drama with the class before students learn to become active prosumers of the transmedia. Taking part in the transmedia production does not necessarily require a great deal of work. It can be a small task as simple as taking part in the "6 word Shakespeare" contest online, in which participants can share their own 6-word Shakespeare stories with netizens worldwide.

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Use of Perusall for Pre-class Reading Assignments in an English Reading and Writing Course at the Tertiary Level: Students' Perception of a Flipped Approach

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Abstract. This book chapter will present the integration and implementation of Perusall in a flipped online English Reading and Writing Course. Perusall was chosen primarily because it aroused English as a second language students' interest in reading different text types as well as enhancing reading and writing skills and establishing their appreciation of literary texts. Perusall gives students the chance to be both elicitors and respondents to questions raised by others, which provides the opportunity to learn from their peer feedback and to realize the importance of critical evaluation of literacy texts. Ultimately, students benefit from a greater appreciation of the aesthetics of literacy texts, which also furthers their understanding of the strong correlation between reading and writing. Overall, it would seem that the introduction of Perusall within a flipped classroom has been an effective strategy to enhance learning motivation among students and promote critical reading during the COVID-19 pandemic.

Keywords: Perusall · Flipped classroom · Critical reading · Literacy texts · COVID-19 pandemic

1 Introduction

Generally speaking, undergraduate students world-wide are expected to cope with a vast amount of reading materials for each course. However in the case of Hong Kong, universities use an English medium of instruction for students which are English as a second language (ESL) learners. In this situation, students may find it too cognitively demanding to read a variety academic texts, such as literary works, journal articles and reference books (Berry et al. 2010). This is especially evident in an educational environment where rote learning and memorisation are emphasised (Dong 2015).

Apart from simply comprehending the context, students also need to "develop their understanding of what it means to think – and read – critically" (Wilson 2016, p. 257). While reading might be seen to be individual task in higher education, critical reading should in fact be interactive and collaborative (Warsah et al. 2021). Providing such interactive lessons during the pandemic was difficult on video-conferencing platforms,

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such as Zoom and Microsoft Teams, using teacher-led learning methods. To encourage ESL students to participate actively during the lesson and develop their critical reading abilities, a flipped classroom approach was adopted in the hope of cultivating better self-reading behaviours in students, which is a core element in university education (Moore 2013).

In the paradigm shifting flipped classroom of this study, ESL students were required to complete readings on Perusall prior to joining the class. One of the main benefits of a flipped lesson is to allow more concrete and interactive in-class activities, in which students' engagement with instructors can be further enhanced (Miller et al. 2018). Students seem to gain a better understanding of the lesson content since reading materials are distributed in advance of the class (Schwartz and Bransford 1998). Other benefits include more students' elicitation of questions to teachers during the class time (Marcell 2008), more peer interaction (Zainuddin and Perera 2019) and even better performance in the examination (Dobson 2008). There is a close bonding between pre-class reading and in-class participation particularly in flipped classrooms that heavily rely on strong students' engagement in an online learning environment.

Even though the flipped classroom approach has been widely adopted during the pandemic, the addition of Perusall could cause some difficulties as students may be unfamiliar with the new platform. Regardless, The introduction of Perusall in a flipped classroom could be considered an innovation since it requires both teachers and ESL learners to change their mindsets and take active roles as facilitators and participants in a classroom context. This may lead to a change in modes of learning from the teacher-centred approach, typical in Hong Kong's exam-oriented environment, into a more student-driven approach. Therefore, this article will seek to analyze the successful adaption of the social annotated platform, Perusall, into a flipped classroom curriculum. Evidence of its usefulness and effectiveness will be provided through the case study of an undergraduate ESL Reading and Writing course.

2 The Teaching Context

This study was conducted at a university in Hong Kong with English as the medium of instruction. It was implemented into the course "Advanced English Reading and Writing", an elective course for all Year 1 and 2 undergraduates. These students came from diverse faculties such as Humanities, Social Sciences and Engineering, and had all completed the pre-requisite English academic writing course. Due to the COVID-19 pandemic, this course was conducted online for three hours each week in a 13-week semester. The course aims to help students by developing their ability to read a variety of texts in a critical manner and to write texts that demonstrate knowledge and insights. Approximately 600 students attended 34 sections of the course when this study was conducted.

The main learning outcomes of the course are (1) to reflect upon and critically analyze texts of different genres and styles, identifying the writers' aims and stances, (2) to identify and evaluate language used to make claims and support these with valid arguments, and (3) to write a text which offers their opinion and interpretation of an issue and also demonstrates critical thinking and creativity. In previous years, this course was

conducted face-to-face and students were asked to complete the readings and to critically evaluate the different text types with reference to the given materials. However at the end of the semester, students expressed dismay, in a Student Feedback Questionnaire (SFQ), that they were asked to do the readings individually and without sufficient teacher input or interaction. In response, the course instructors began to consider innovative ways to increase students' engagement and interaction with the use of technology.

Perusall was selected from the available technology primarily because of its versatility, which allowed for the inclusion of different texts, for example, e-books, electronic articles and subject-specific materials. It further offered a user-friendly social media style, which was felt would make students more comfortable when interacting with peers (McCulloch et al. 2017). Overall, it was believed that Perusall would allow students to read extensively, in an interactive way, and to become more critical readers and writers.

To better understand the challenges of teaching critical skills to Hong Kong ESL students, one should consider Davies and Barnett's (2015) three essential perspectives to developing a student's critical reading ability. The first perspective is *skills* which involves interpreting texts, analysing ideas, synthesising arguments, making inferences and evaluating results. Although these skills are essential to developing higher-order thinking, most of the existing reading materials are beyond the student's level of comprehension (Cotterall and Cohen 2003, p. 163). This may be the result of the exam-oriented culture in Hong Kong as it is quite challenging for undergraduates to develop higher-order strategies in reading, such as comparing and contrasting texts (Lee 2018). Therefore these skills must be explicitly taught in ESL classrooms.

The second perspective is the *criticality*. While knowledge, skills and reasoning are equally important, Hong Kong students seem to lack reasoning skills. This could be attributed to their engrained method of learning through memorisation or their apparent inability to question knowledge provided by the teacher. Self-reflection, being a core element of criticality, has received little attention in the curriculum which has made it difficult for students to self-regulate their learning. The third perspective is *critical pedagogy* which requires students to be proactively responsible for their learning and to criticise different ideologies within texts. Wallace (2003) suggests that students should meet regularly and discuss articles together in order to engage in the issue and develop their own positions.

With these factors in mind, this case study course began by introducing the key features of reflective and critical reading a identification of a writer's stance, interpretation of themes within texts, examination of language features of texts, critical evaluation of literary genres and stylistic features. Adopting the flipped classroom approach, students were required to use Perusall to complete pre-class reading assignments and analyze some stylistic and rhetoric devices in the texts, follow by a 2-hour online class. The second half of the course focused on acquiring the skill of writing effective feature articles. To accomplish this, students were asked to identify the feature and different structures, apply different types of text organizational writing strategies and integrate visual materials effectively into a feature article.

3 Reasons for the Innovation

Front-line ESL teachers often encounter obstacles when introducing reading activities and that is certainly the case in the Asian context, where many students lack interest in assigned reading, not to mention independent or voluntary reading (Chang and Renandya 2017). Therefore, new methods and technologies are necessary to attract these students to become more engaged readers. Cope and Kalantzis (2015) explain that using traditional paper-based materials contradicts the usual practices of young adults, who interact with digital multimodal texts more often. By including visual components or social media platforms in the curriculum, teachers can better engage students and promote learning beyond the classroom setting. Tan and McWilliam (2009) believe that, when reading is implemented in an online environment, the technologically-engaged students can develop more socially and cognitively. Davison (2013) also concludes that the lack of discussion, negotiation and feedback with teachers and peers during the reading process would discourage students to self-evaluate or develop personalised plans for improvement. Some formative items, such as idea interpretations, should be included in the reading task. A lack of exposure to different text types leaves students with insufficient language inputs which will eventually impair their reading competency. Ensuring this varied practice in the target language is one of the most crucial roles of second language teachers (Al-Zoubi 2018). In order to fulfill this obligation, teachers may wonder why their students don't enjoy reading and how they might further promote reading to Asian university students. Furthermore, might the use of traditional e-books suffice in a flipped classroom format?

It is well agreed that students should keep pace with emerging technologies and learn new skills in such a digitally-connected world. Sharkey (2016) stresses the importance of shaping undergraduates' literate behaviours which should be "multiple, multimodal and mediated through new technology" (p. 1). Students in the 21st century are required to have the capability "to critically frame, evaluate, understand, make-meaning, and use multiple forms of text in socially generative and productive ways across diverse communicative and learning contexts" (Tan et al. 2017, p. 118). In line with this, the pandemic prompted educators to include new elements that would further break away from the conventional language classroom practices. Educators exploring the potential of social media has become trendy in recent years (Hafner et al. 2013) and a consensus has formed that young adult learners should be given opportunities in the curriculum to enhance their language competences through social network platforms (Mueller 2009), such as Perusall.

By adopting Perusall in a flipped classroom, it was believed that students could improve both reading engagement and critical evaluation. The high degree of interactivity on Perusall might even see the emergence of an online social environment centred around collaborative learning, a true innovation for both teachers and students.

4 The Innovation Aspect

The following section describes the use of Perusall and highlights the importance of online interactiveness and collaboration among teachers and peers. As a social annotation platform, Perusall is specially designed to promote pre-class reading assignments,

enhance students' engagement and consolidate conceptual understanding. When using the platform, teachers are required to first create an online course within Perusall prior to assigning tasks to students (see Fig. 1). Teachers are then able to add any sharable electronic materials in order to create pre-class reading assignments. Figure 2 displays Perusall instructor course view, showing different pre-class reading assignments and overall assignment progress made by students in a particular class.

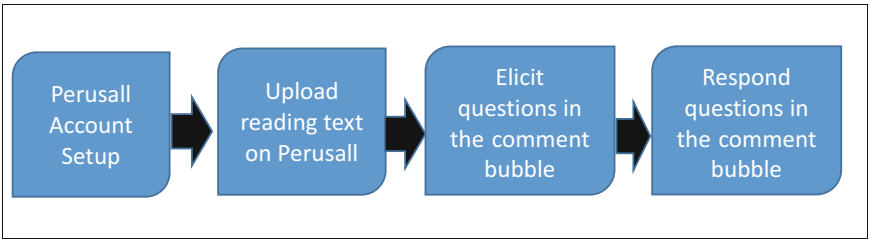

Fig. 1. Overview of Perusall pre-lesson assignment set-up

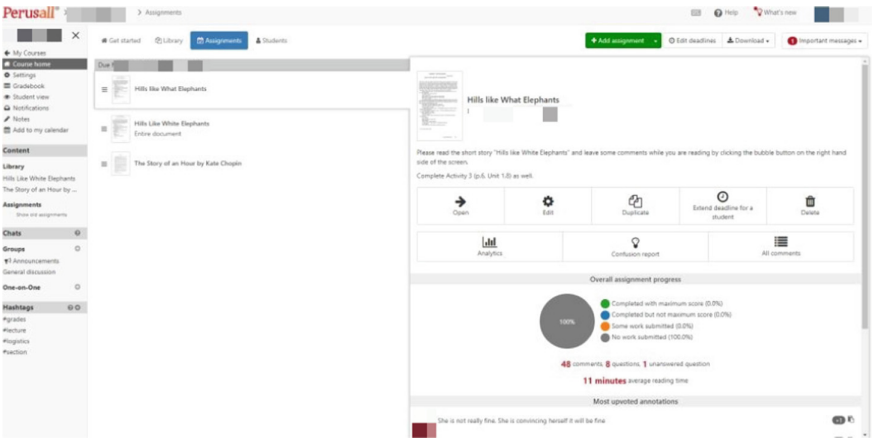

Fig. 2. Perusall course instructor view

Once reading materials are uploaded on Perusall, teachers can initiate their pre-lesson assignments by highlighting some lines from the text, followed by elicitation. Students can now respond to the teacher's questions by leaving their comments or critical reviews within a comment bubble. Figure 3 illustrates how students can offer feedback on the annotations made by other students in the same class by "upvoting" annotations. The function of "upvoting", underpinned by Vygoskian socio-cultural theory, is tagging other students who have posted a good question or comment. Students may upvote by clicking an orange question mark icon in the comment bubble which then draws the attention of other students as well as aides teachers in deciding which areas to spend more time on in discussions. Likewise for upvoting on a comment, users can simply click the green checkmark icon. This provides some feedback to the author of the comment

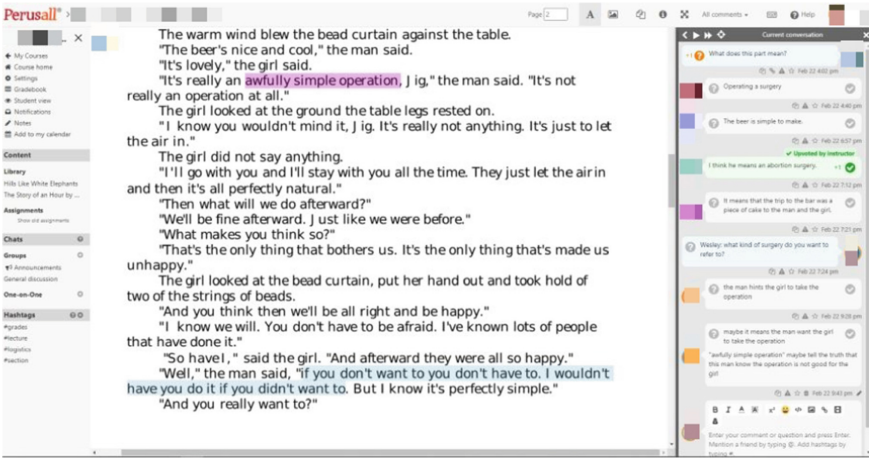

Fig. 3. Reading assignment showing both teacher and students highlights and annotated comments

and signifies appreciation from their peers. Thus, the practice of upvoting can develop students' meaning-making capabilities (Eryilmaz et al. 2013) whereby scaffolding takes place through collaborative discussions based on peer comments and critical ideas.

5 Methodology

5.1 Participants

In order to judge the effectiveness of this new curriculum and to understand the students' learning experience with Perusall, questionnaires were distributed to students (N = 160). Eight Hong Kong students and twenty-two mainland Chinese students also voluntarily participated in semi-structured interviews. Pseudonyms were used to protect participants' anonymity, and participants could withdraw from the study at any time.

5.2 Data Collection and Analysis

The results were gathered from semi-structured digitally recorded and transcribed interviews with 5–6 groups of students enrolled in an English course offered by a university in Hong Kong with English as the medium of instruction. Göras et al. (2020) believe that the group dynamic can help researchers to collect more information related to the student experiences. Interviews ranged from 18–26 min in duration, chosen due to the fact that they produce rich responses in either a Cantonese or Putonghua-speaking environment that does not seem hostile and uncomfortable (Brinkmann 2014). The researchers adopted interpretive thematic analysis to examine how Perusall could maximise the attainment of students' learning outcomes (Alase 2017). The following questions were asked:

Q1) How would you like to rate Perusall?

Q2) When compared with the traditional way of reading, do you think Perusall can help you understand more about the content, tone and symbolism, or even underlying meanings of the reading text?
Q3) Did anything make you engage with the Perusall reading platform prior to the lesson?
Q4) Did anything make you not engage with the Perusall reading platform prior to the lesson?

Some precautions were taken to safeguard data validity. The two researchers adopted thematic analysis to evaluate the interview data (Nowell et al. 2017). The interview data was coded with reference to the guidelines provided by Denzin and Lincoln (2013). In this sense, the data can be more stable and dependent over time. Independent coding was conducted twice with the second taking place two weeks after the first. These two rounds of coding displayed nearly identical data. The researchers also selected some quotes from the interviewees (Merriam and Tisdell 2015). Two member checks were conducted to ensure the data trustworthiness (Crawford et al. 2020). The interviewees were given the translated transcripts in English. The two researchers did not receive any amendment requirements from the interviewees.

A total of 30 responses were coded through the thematic analysis and 4 themes were identified. The thematic map showing responses is illustrated in Fig. 4. Emerging from the interview data, the 4 themes provide significant insights into the ESL student learning experience with the support of Perusall during emergency remote teaching.

6 Reflection

6.1 Usefulness of the Platform

From the following comments, one can infer the usefulness of the platform:

> 'Perusall is really fun and convenient because it highlights related words and mentioned phrases. Sometimes, it's hard to find where the word is quoted in questions. With Perusall, we can find it in pages of readings within a click.' (John)

> 'The use of Perusall helped me better understand the core meaning of the article.' (Judy)

> 'It makes me learn a lot. I'm in the text, commenting and encouraging. When everyone reads, class time is so different.' (Belle)

> "I am very shy. After using Perusall, it makes me at least present a bit more of myself in virtual spaces than typical online discussion board or Wikis.' (Sally)

> 'I can get the summary of the text easily after joining Perusall discussion. I can co-construct meaning with others and enhance our learning when we engage in the Perusall reading activity.' (Jason)

It is evident that students found it useful to express their opinions while socializing on the platform. These comments show that the combination of the flipped classroom

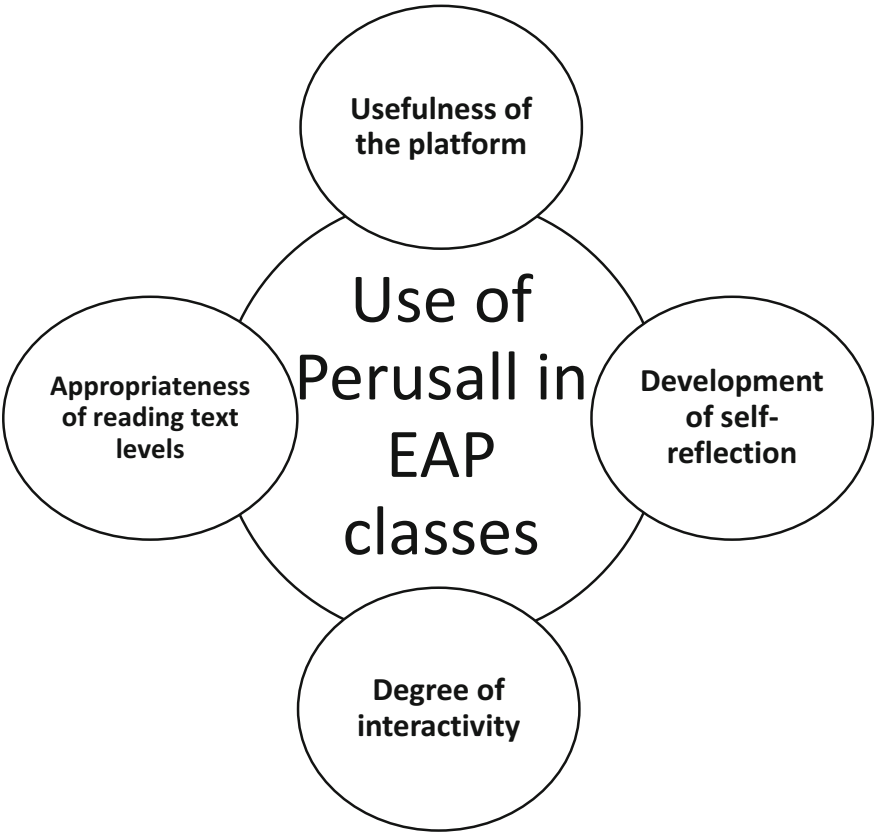

Fig. 4. Thematic map

approach, together with the use of Perusall, seems to have created a collaborative reading environment. Even though the classes were conducted online, they felt the active support and profound connectedness to classmates by co-constructing understanding of the text. Participants also appreciated the annotated comments as it visually displayed their learning progress.

6.2 Development of Self-reflection

As Perusall allows students to refer to the commentaries as often as needed, this helps learners to become more reflective and to study their own strengths and weaknesses by comparing their comments to others'. With a relatively high student-teacher ratio in Hong Kong, Perusall offers another avenue of formative feedback from peers and can aide students in developing a suitable personalised plan for improvement (Ho 2020). Students can focus more on the learning process and achieve a better performance in assessment tasks. In this sense, it is a step away from teacher-led online classes towards a more student-centred and self-regulatory learning environment.

Even though students' comments were overall positive, some concerns regarding Perusall were expressed:

> 'Sometimes Perusall is completely invisible if the website background color isn't white. The highlighted phrases indicating comments, in this case, are not so easy to read.' (Peter)

> 'I didn't know what I should start when I first used Perusall. Also, my understanding of the text was distracted by some other comments left in the comment bubble.' (Samson)

Apart from the interface design, teachers should pay attention to the timing of comments. For example, Samson posted his comments late and would have likely been influenced by the comments previously posted. One way to tackle this is to encourage students to read and comment early, and then go back to read responses and give more comments. However it might give rise to a new issue where students actually find this process even more cognitively demanding, as they also needed to pay attention to peer responses.

6.3 Degree of Interactivity

The following comments describe the degree of interactivity.

> 'Through Perusall, I can have more interaction with teacher. You know, it is a bit weird to keep on raising questions in the chat box through Blackboard. Many classmates will feel you wanna show off.' (Heidi)

> 'I love the way the reading article is presented. When I was doing Perusall reading, I was not just simply doing reading myself. I can be with everyone. We didn't have any face-to-face classes for almost 2 years. I can only have classes day by day in front of the screen. It is a very lonely and helpless learning journey.' (Beatrice)

> 'Once I started reading on Perusall platform, I could share my knowledge and way of thinking to everyone including teachers and classmates. Unluckily, in this semester, I could only meet my teacher and classmates for the first two weeks and then the university announced that all classes should be changed to online mode again until the end of the semester. But with the use of Perusall, I can still feel I am on the same boat with my teacher and classmates. Everyone can give me comments. I can learn from each other.' (Christopher)

While learning collaboratively on Perusall, students found it evidently useful and were more willing to elicit questions, respond to others including both teachers and classmates. Participants also appreciated the Perusall platform since it provided them some room for information exchange and fostered both teacher-student interaction and student-student interaction. According to Xie and Derakhshan (2021), the use of cooperative groups during class stimulates peer-to-peer exchanges of information, which increases teacher-student communication and promotes an engaged learning environment (Derakhshan 2021). In the context of good teacher-student relationships, engagement, success, and enthusiasm are effective factors that could facilitate proper learning outcomes (Derakhshan et al. 2019; Pishghadam et al. 2021).

6.4 Appropriateness of Reading Text Levels

Perusall allows teachers to either purchase e-books from Perusall library or upload their own materials in PDF or EPUB format, this helps teachers to select the appropriate reading texts that can make students engage during their reading journey. Rog and Burton (2001) highlighted the importance of matching texts and readers. Once reading materials are carefully and suitably selected, students' engagement can be boosted to a certain extent. This can be reflected by the following concerns:

> 'If I find the text is interesting and easy to understand, I may spend more time on the pre-reading assignment as it is not compulsory and it doesn't bear any mark.' (Apple)
>
> 'Sometimes, I found the short stories and limericks chosen be teachers very difficult. So I may not get involved in keeping on reading via Perusall because there are so many big words that I really don't know.' (Macy)

By referring to Perusall Analytics including viewing time and activity reading time, professional judgment can then be made by teachers in relation to the appropriateness and suitability of literary texts. Rog and Burton (2001) pinpointed the key success of the reading activity lies in whether teachers have detailed knowledge of the students' backgrounds, personal interests, and reading processes so that they can choose the best books for them. By clearly seeing student engagement with texts, over time teachers can find which texts stimulate students and which do not.

7 Pedagogical Directions in the Post-pandemic Landscape

This study was designed to explore the feasibility of integrating Perusall into a flipped classroom, during the post-pandemic period, and the results are encouraging. The research suggests that the majority of students enjoyed using Perusall to develop their extensive reading skills and critical reading skills. Implementing Perusall into pre-lesson assignments appeared to arouse students' interest in different literary texts as well as strengthen their reading skills. It was further reassuring to observe a sort of transformation in students that became deeply engaged with the meaning making throughout the process.

Despite these impressive results, there are several lessons to be learned from the experiment. The fact that a few students did not complete, or even attempt the pre-class task, demonstrates the continued importance of providing students with incentives for engagement, especially in an exam-oriented environment (Ho 2020). To incentivise and maintain fairness, a certain percentage of the coursework mark could be allocated to the participation in Perusall assignments. Such practice can ensure enough participation in a flipped classroom by encouraging students to articulate their views with sufficient explanations. More importantly, students can understand the importance of literacy appreciation in university education and transfer these reading skills to subjects in their own disciplines.

It also became evident that teachers must give very clear instructions prior to the start of the Perusall assignment. Teachers are also encouraged to reply to student comments

often and in a timely manner (Lee and Azman 2020) because spontaneous interaction through Perusall can keep students engaged in learning, thereby effectively facilitating students' learning process. This study also brought to light some gaps in the research literature. It is worth noting that future studies along this topic could benefit from measuring students' learning effectiveness by studying the correlation between their reading behavior and their in-class test or even semester-end exam performance.

Changing the mindsets of teachers and students about the value of integrating Perusall may take time as some cast doubt on the necessity of the flipped classroom approach after the pandemic. In spite of this, undergraduates coming from the exam-oriented secondary education system should be encouraged to develop the literacy skills that are needed in the 21st century. Finally, it can be asserted that a flipped classroom, a pedagogically meaningful tool, such as Perusall, and well-designed learning activities can fully support students in the post-pandemic period. It not only helps students to understand the subject content, but also enhances self-reflection in their learning process. It also encourages them to take responsibility in developing personalised improvement plans, which will help them to grow personally and academically.

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Is Extra English for Academic Purposes (EAP) Support Required for Degree Holders Pursuing Master Programmes in Less Familiar Fields?

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Abstract. With a view to identifying academic significance of English for Academic Purposes as a core subject in English across curriculum in a vast majority of universities and tertiary educational institutions in Hong Kong and other non-English speaking countries and cities, the research aims at studying university learners' strategies in transcending master degree programmes in fields that learners are not familiar from bachelor degrees. With the questionnaires and interviews, the study first compares undergraduates and postgraduates' acknowledgement of Academic English as a measurement of their English competency at universities, as evidenced by their recount of university classrooms in bachelors and masters in Hong Kong and/or outside Hong Kong, in addition to reading, listening, writing and speaking experience in workplace and social life. The research then analyzes the psychological behaviors of these learners towards English for Academic Purposes in application to real life experience, which is subjected to the contexts of communication and needs.

Keywords: Academic development · Academic Literacies model · Linguistic convention

1 Introduction

The academic significance and value of English for Academic Purposes (EAP) is recognized as demonstrated by how such subject has become compulsory and pre-requisite for freshmen in bachelor degrees for English across curriculum in a vast majority of universities and tertiary educational institutions in Hong Kong and other non-English speaking countries and cities. According to Gu and So (2015), degree-seeking candidates of all nationalities are expected to understand different varieties of English that they will be exposed to. Higher education institutions have to accommodate English varieties by students and faculties members. In addition, it has become increasingly common for Academic English assessments to be deployed and accepted in multiple countries for

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university admissions purposes (Gu and So 2015). Scholars have been debating over the importance of discipline-specific writing skills for academic preparedness (Wollscheid et al. 2021). According to *academic literacies* (Lea and Street 1998a), learning in higher education involves adapting to new ways of knowing: new ways of understanding, interpreting and organizing knowledge. Academic literacy practices reading and writing within disciplines constitute central processes through which students learn new subjects and develop their knowledge about new areas of study. A practice approach to literacy takes account of the cultural and contextual component of writing and reading practices, and this in turn has important implications for an understanding of student learning (Lea and Street 1998b). Reading and writing skills at the university level can be characterized as both generic and discipline specific, especially for writing (Wollscheid et al. 2021). It has been argued that questioning, summarising, clarifying and predicting are all phases of the learning process that students need to pursue despite challenges, exemplifying what it means to master academic work. Given reading and writing are core strategies by which students learn new subjects and develop their knowledge about new fields of study (Wollscheid et al. 2021), English for Academic Purposes (EAP) has always been regarded as the major medium of reading, writing and speaking in master degree programmes. It is common for learners in university to change their fields of study during academic pursuits, and previous research has suggested the way knowledge is exchanged in writing varies from discipline to discipline. In other words, when learners make a transition from one academic community into another, their learning progress could possibly be hindered by their unfamiliarity. This research aims at investigating whether English for Academic Purposes (EAP) is necessary to support degree holders to further pursue their master degrees when switching their further studies to less familiar subjects. While reading on different levels is seen as a core learning strategy, writing and speaking are regarded as both a learning strategy and a way to demonstrate learning outcomes (Wollscheid et al. 2021). This research primarily focuses on examining the writing and speaking competency of the interviewed master degree graduates as Academic English writers and speakers. The followings are the research objectives:

1. To what extent do master graduates recognize the importance of English for Academic Purposes (EAP) when they switch to less familiar subjects that are different from their bachelor degrees?
2. To study whether freshmen who are new to their own discipline would be disadvantaged when expressing their academic ideas.
3. To compare the disciplinary writing, speaking experience and development of degree graduates articulating into master degree programmes in fields that they are not familiar with.
4. To examine master graduates' perceptions over English for Academic Purposes (EAP) as a compulsory curriculum in Hong Kong and overseas.
5. To what extent do culture of one place, institutional culture and policy affect university students' learning experience?

2 Literature Review

Although there is a range of literature exploring English as a Second Language (ESL) or English as a Foreign Language (EFL) regarding students' English language learning style preferences, there appears to be very limited research into language learning style preferences and students' perceptions towards the necessity in the specificity of English for Academic Purposes (EAP) contexts (Wong 2015). Academic Purposes (EAP) is supposed to be designed for non-native English speakers who have sufficient language skills to enhance their language ability in order to tackle courses in English-medium learning environments (Jordan 1997, as cited in Wong 2015). This study is regionally specific to Hong Kong, providing the academic recognition and significance of English for Academic Purposes (EAP) as shown from how such subject has been conventionally set to be compulsory for freshmen English across curriculum in a vast majority of universities in Hong Kong. According to Shing and Sim (2011), a needs analysis found out that most of the undergraduates not only require language support at university, but also claimed that this support should be oriented towards academic rather than general English.

It is interesting to consider the implications of university students' internationalization of their level of English competency in relation to their ability to master English for Academic Purposes (EAP) well, providing with Hong Kong students' learning experience of English for Academic Purposes (EAP) as a Second Language (ESL) or English as a Foreign Language (EFL). Hyland (1997) investigated the necessity for English for Academic Purposes (EAP) of undergraduates from eight disciplines at five tertiary institutions in Hong Kong. His research revealed that Hong Kong students appear to recognize the importance of English competence to their academic success and acknowledge the value of English for Academic Purposes (EAP). In the research, it was concluded that students from different disciplines confessed to difficulties with English, giving particular weight to writing, speaking, and specialist vocabulary, and admitted that they considered their English skills inadequate to meet their academic goals. Moreover, it appears that these perceptions persist into postgraduate levels of study (Cooley and Lewkowicz 1995, as cited in Hyland 1997). It is also important to note that students' perceptions of difficulties in learning English for Academic Purposes (EAP) reflect the fact that undergraduates are forced to deal with a host of new terms, many of which have no Cantonese equivalent.

In addition, the results offer some support for claim that "vocabulary knowledge is the single most important area of second language competence" in academic achievement (Saville-Troike 1984, as cited in Hyland, p. 199). Hyland's study (1997) has highlighted the frustration of Hong Kong undergraduates towards the acquisition of Academic English given the gaps among different linguistic systems of Academic English, general English, written and spoken Chinese. Given the predominance of English for Academic Purposes (EAP) as a compulsory subject for freshmen English in most universities and tertiary institutions in Hong Kong, the research aims at investigating how institutional culture and policies become contributing factors to affect students' English for Academic Purposes (EAP) experiences at their degree programs, and to what extent can such degree experience impact further studies in other subjects that are familiar and unfamiliar to their bachelor degrees in postgraduate level.

Academic Purposes (EAP) courses mainly cover study skills which students need to use in tertiary studies, for example, academic writing, listening and note-taking, referencing skills and presentation skills (Wong 2015). Further to the forementioned dimension of specific vocabulary that students encounter in English for Academic Purposes (EAP) which are seldom used in conversational English, this does not guarantee students who are good at General English would also be able in English for Academic Purposes (EAP). Some researchers maintain that English for Academic Purposes (EAP) does not entirely rest on study skills (Jordan 1997, as cited in Shing and Sim 2011), but on the things like general Academic English register, incorporating a formal, academic style with proficiency in the language use in addition to study skills. However, he also mentions that in contexts where it is necessary to address the linguistics needs of specific disciplines, the focus on non-specialized language may not be adequate for students to handle functions and notions of discipline specific language. The distinctive features of Academic English, thus the possible frustrations of university students towards it, forms a fundamental framework for this research to study the psychoanalysis closely regarding the phenomena of students' measurement of academic success in English to the equivalence of literacy towards English for Academic Purposes (EAP).

In comparing to the design of English for Academic Purposes (EAP) in university curriculum in Hong Kong, data have also been collected from students who have overseas educational background in their degree studies. According to Wong (2015), to understand an academic journal article, Chinese students generally internalize that memorization of basic knowledge is essential for proceeding to advanced learning. Such belief is consistent with the Chinese traditional belief of learning by memorizing knowledge at the early stage, and when they have a deep understanding of a subject, they can proceed to a more advanced stage, that is analyzing and investigating knowledge by using the basic knowledge they have acquired (Wong 2015). In Western countries, memorization of knowledge was equated with rote learning (without understanding). Despite this, limited literature have been examining how culture in one place can be a determining factor to affect the learning style, in particular to the context of English for Academic Purposes (EAP). This can be explained by the cultural assumptions that English for Academic Purposes (EAP) is only to be studied by non-native English speakers, whose mother tongue is not English. Learners with high English language competency should be able to perform well in Academic English writings. This study thus juxtaposes both groups of respondents, including non-native and native English speakers, with the academic backgrounds in studying from a familiar bachelor degree to another familiar subject in master degree; and respondents with a switch from a familiar field in bachelor to an unfamiliar postgraduate degree.

In viewing learning experience of switching from one familiar context to another unfamiliar context, the first approach of *academic socialisation* model connects the teaching of writing and other academic skills with the acculturation of students into disciplinary genres and discourses. The sources of this perspective lie in social psychology, constructivist education and situated learning. Going beyond skills and socialisation, the *academic literacies* model views literacies as social practices. Students must switch among initially unfamiliar practices as they move from one setting to another. Their work is seen as connected to meaning-making processes, and contestation around meaning,

rather than to skills or deficits (Bury and Sheese 2016). This research mainly investigates whether linguistic literary and sensitivity towards the acquisition of Academic English in writing and speaking plays a dominant role to impact the learning experience of master undergraduates in less familiar subjects. According to Lea and Street (1998a), the second model, *academic literacies*, is concerned with meaning making, identity, power, and authority, and foregrounds the institutional nature of what counts as knowledge in any particular academic context. The study testifies and validates the processes involved in acquiring appropriate and effective uses of literacy as more complex, dynamic, nuanced, situated, and involving both epistemological issues and social processes, including power relations among people, institutions, and social identities. The last approach of *study skills* model, which sees writing and literacy as primarily an individual and cognitive skill and focuses on the surface features of language form and presumes that students can transfer their knowledge of writing and literacy unproblematically from one context to another (Lea and Street 1998b). Hyland (2011) also proposed that knowledge is exchanged in writing varies from discipline to discipline and learning progress could possibly be hindered by learners' unfamiliarity with the linguistic conventions and literacy practices salient in their new study areas when they make a transition from one academic community into another. There has been assumption that skills are like units that can be transferred readily from one context to another and thus students must switch among initially unfamiliar practices as they move from one setting to another (Lea and Street 1998b).

According to Hyland's *social practices and disciplinary conventions* (2011), persuasion in academic articles involves the use of language to relate independent beliefs to shared experience. In other words, writers must display familiarity with the persuasive practices of their disciplines, encoding ideas, employing warrants, and framing arguments in ways that their potential audience will find most convincing. Writers galvanise support, express collegiality, resolve difficulties, and negotiate disagreement through patterns (Hyland 2011). They must recognize and make choices from the rhetorical options available in their fields to appeal to readers from within the boundaries of their disciplines. While interaction in academic writings involves positioning, claims for the significance and originality, research have to be balanced against the convictions and expectations of readers (Hyland 2011). Meanings are ultimately produced in the interaction between writers and readers in specific social circumstances and thus writers seek to project a shared professional context which only partly depends on domain knowledge (Hyland 2011). To generalize, reading and writing are understood as social and context-dependent practices that are influenced by factors such as power relations, the epistemologies of specific disciplines and students' identities (Hyland 2011). All these proposed theories provide a basis for researching to what extent English for Academic Purposes (EAP) assists undergraduate learners to understand the unfamiliar subject knowledge and academic contexts in their master degrees, and the other controllable factors subjected to the academic backgrounds, rhetorical expectations and processing needs of individuals with reference to their competency level towards literal meanings of English words.

3 Research Methodology

The representativeness of samples is guaranteed by collecting data from respondents who have distinctive cultural and academic backgrounds in their university education. Questionnaires and interviews were both conducted with 12 respondents and interviewees, who accomplished their master degrees in universities in Hong Kong and universities overseas, representing the western and eastern cultures, including countries like Australia, Canada, the United Kingdom and Japan. These respondents were located physically in Hong Kong during the interview time, who were all master graduates from diversified faculties and fields of Business, Finance, Marketing, Medicine, Law, Psychology, Counselling and Engineering. All of them had been staying in Hong Kong for at least several years to work for living. Therefore, Hong Kong is a controlled factor in which they all share the similar workplace and social contexts to use English for communication. Half (50%) of them studied their master degrees in a different disciplines of their bachelor degrees while less than half (41.7%) of them pursued further studies from their bachelor degrees in the same area of interests (Fig. 1).

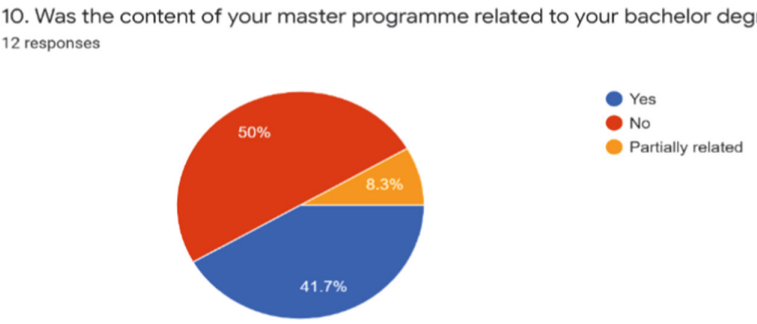

Fig. 1. The similarity of academic content between master degrees and bachelor degrees

3.1 Findings

The surveyed group was also divided into the first group (25%) who regarded themselves as using English as a second language while the second group (25%) internalized themselves as native English writers and speakers (Fig. 2). For writers and speakers who acquired English as their second language, their mother tongue included Chinese, Cantonese, Portuguese or Japanese. On the other hand, among the English native speakers, their second language included Mandarin, French and Spanish. The major functions of using English for writing purposes included work and effective communication. Meanwhile, the chief purposes of speaking in English served the functions of work, family, relationship, friendship and effective communication.

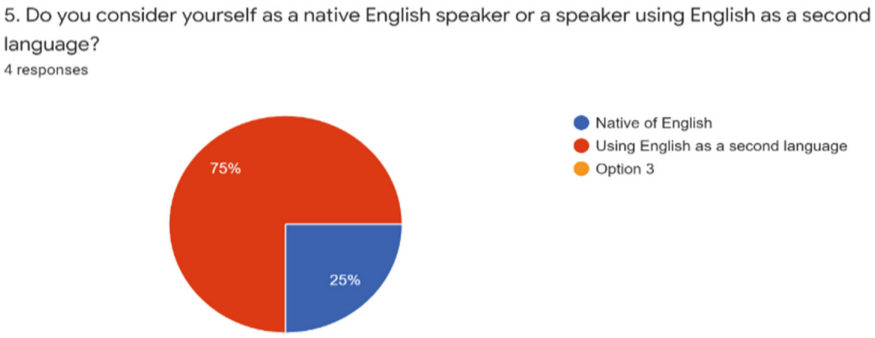

Fig. 2. Self-identification as native English speakers or second language acquisitors

4 Results and Discussions

4.1 Cognition of English Academic Purposes (EAP) as a University Subject

More than half (58.3%) of the respondents knew what English for Academic Purposes (EAP) is while one-third (33.3%) did not. Interestingly, one respondent identified herself as a native English speaker who believed Academic English needs training which can assist learners in writing. This implies her understanding of Academic English to be confined to writings which can be trained up (Fig. 3).

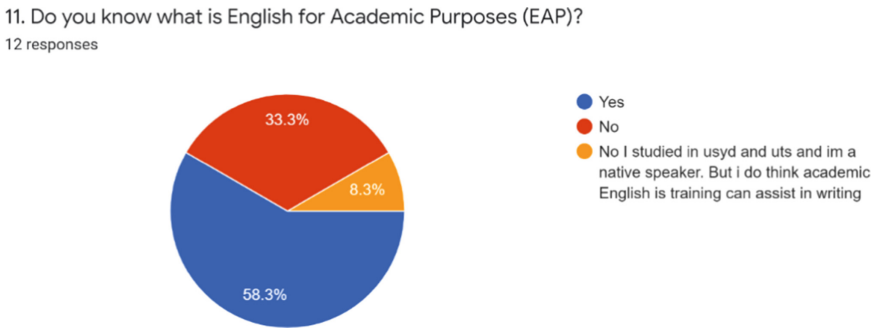

Fig. 3. Cognition of English for Academic Purposes (EAP) as a subject

Furthermore, the same interviewee claimed that "Academic English is not the everyday traditional English I will use. It requires deployment of wider vocabulary and depth, plus techniques in citation and bibliography and how to paraphrase etc. Perhaps we can sometimes lack practice as nowadays we use brief and short form English a lot in our everyday work environment and the level of English in Hong Kong has deteriorated especially in grammar. But even when I was in Australia, this training I think is relevant to maintain academic excellence". This interviewee, who identified herself as a native English writer and speaker, highlighted the major difference between Academic English and informal general English, with reference to the distinction between contexts and

daily basis. She agreed with English for Academic Purposes (EAP) as an indicator of academic achievement in universities. When it comes to other contexts for the purpose of effective communications like in workplace and daily life outside academic institutions, informal general English is more commonly used, without the need to acquiring citations and paraphrasing skills. With the pursuit of master and bachelor degrees in Australia, she held the view that level of English has declined in Hong Kong especially in grammar due to lack of practice from the point of view of a native English writer and speaker.

One interviewed also expressed the opinion that "It's crucial for freshmen students to understand how to critical read and write essays, reports, bibliographic essays and citation skills to be successful in the rest of their academic life. This includes understanding the academic writing conventions". Such interviewee was able to indicate the subtle difference between Academic English and formal general English by emphasizing citations and bibliography. Academic writing conventions become a fundamental subject for freshmen English in universities, which is instrumental to further their academic life in future. Among the interviewees, most of them heard of English for Academic Purposes (EAP) as a subject in universities. They understood it as "The appropriation of language for academic purposes" and "Students are trained to use English language appropriately for specific purposes." Most of them acknowledged that English for Academic Purposes (EAP) is "English for school assignments and research paper" and it is the "Use of a specific tone and ways of expression for delivering academic messages in its uttermost neutrality and objectivity". However, one interviewee said "I don't know".

As shown from the above findings, it is obvious that most master graduates were able to understand what English for Academic Purposes (EAP) is by highlighted citations, paraphrasing and summarizing skills, references and bibliography, objective language and academic registry are some suggested core components regarding their perception over Academic English. Apart from the essential elements, a majority of the respondents and interviewees also related Academic English to the application in the academic contexts like universities and academic institutions all over the world. However, a few of them failed to recognize the subtlety between Academic English and formal general English. In short, most of them agreed English for Academic Purposes (EAP) should continue to be a compulsory subject for freshmen in bachelor degrees to lay a foundation to equip their academic reading, writing and speaking competency later for master programmes.

4.2 Recount of the Need to Switch to English for Academic Purposes (EAP) in Master Degree Experience

More than half of the respondents (58.3%) recalled they were not required to switch to English for Academic Purposes (EAP) in their master degrees, while only one-fourth (25%) of them needed to use Academic English in their master programmes. One respondent did not know what English for Academic Purposes (EAP) is and expressed that English for Academic Purposes (EAP) is a subject that does not exist in Australia (Fig. 4).

Among the respondents who understood what English for Academic Purposes (EAP) is, they were interviewed regarding the types of assignment(s) and/exam(s) that required them to write or speak Academic English in their master degrees. The interviewees who

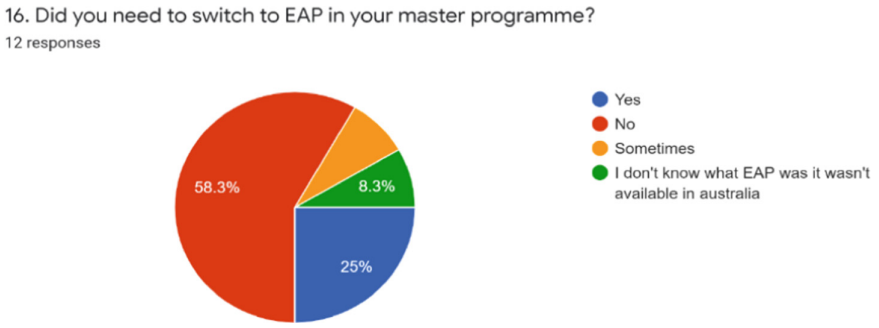

Fig. 4. The experience of switching into English for Academic Purposes (EAP) in master degrees

accomplished the master degrees in universities in Hong Kong recalled those scenarios were related to "educational setting courses" (from arts and humanities graduates), "exams, laboratory reports, clinical journals and dissertation" (from medicine master graduates), and "mediation and arbitration practice" (from law graduates). The graduate who accomplished the marketing master programme overseas claimed that "Academic English was always used since I migrated to Australia and studied there to masters so English was pre-requisite and compulsory". Likewise, some identified the scenarios in which they used English for Academic Purposes (EAP) in their bachelor degrees were the time when they had to finish "all the essays, papers, presentations and assignments". Some also said it was used in all subjects as long as they were related to English language education, except the Chinese compulsory courses and PE. A minority claimed that English for Academic Purposes (EAP) was irrelevant to their bachelor degrees. These indicate that the English for Academic Purposes (EAP) curriculum is set based on the field of studies and the country or city of the universities, and whether English is identified as a native language in the home country or English is a second language for acquisition.

Recounting the strategies in handling assignments and exams that required English for Academic Purposes (EAP) writing and speaking competency throughout the master programmes, the interviewees described their learning experience through "self-reading with reference to google, literature review, journals and dictionaries of different choices for vocabulary checkup". Advanced learners mainly relied on independent learning and they understood vocabulary and lexis to get to know more about the context, especially for less familiar subjects that differentiate from the contexts of the bachelor degrees. In addition, these learners would also seek help from tutors. The collected response from the interviewees indicated that these master degree graduates were aware of the necessity of academic sources and academic writings as the genres used in university studies. All these correspond to the hybrid models of *study skills* and *academic literacies* (Lea and Street 1998b), in which the respondents and interviewees relied on their study skills and academic literacies by appropriating the surface linguistic features to comprehend the new form of knowledge that is foreign to their prior studies. The transition of learners from a familiar discipline to a less familiar subject, with the use of English for

Academic Purposes (EAP), is a complex and dynamic process that involves the negotiation between linguistic conventions and epistemological issues, social processes, power relations among individuals, institutions, societies and cultures.

4.3 Strategies in Adopting English for Academic Purposes (EAP) in Less Familiar Subjects in Master Degree Programmes

In the aspect of ways to cope with the difficulty in understanding English language in less familiar subjects in the master programmes, most of the interviewees revealed that they were used to independent learning when they were master degree undergraduates. One interviewee portrayed that "I didn't quite encounter issues but I did I re-read concepts again but it normally wasn't the language that was the problem. It was the concepts. But if not, I'll ask my tutors to visualise the wording or mind map it myself". Other interviewees also suggested self-studies, google and asking around for help instead of consulting their instructors like what most undergraduate students do during their bachelor degrees. Among those interviewed master graduates, their learning strategies include extensive and close reading, such as journals and medical literature. One interviewee reckoned that online dictionaries, West law and lexis advance are vitally essential for her to survive through the master degree programme in order to study in a discipline that was entirely different from her bachelor one. In contrast, one interviewee acknowledged that no difficulty was experienced given "my English is good". This response excludes the factor of this interviewee's understanding of different specific purposes of English language in tertiary education, which could be subjected by various disciplines. The self-recognition of high level of English competency can in fact fail to be a dimension to determine the Academic English literacy of learners. In other words, while this current research focuses on the study on English for Academic Purposes (EAP) in master degree programmes, some interviewees may self-identify their English competency level to be solely limited to effective communication in daily basis. Thus, these findings exclude the possibility that advanced writers and speakers who use English language at a native level may not be equivalently equipped when it comes to writing and speaking English for academic purposes. In fact, most respondents and interviewees did not comprehend there is a subtle differentiation between Academic English and formal general English. Although both general English and English for Academic Purposes (EAP) are areas of English language teaching, numerous differences exist across various perspectives in the aspects of pedagogical goals, student needs, research streams, and relationship to the academy (Han et al. 2021). In brief, general English mainly aims to teach vocabulary, grammatical structures, and other language skills that can be used for general socializing (Han et al. 2021). On the other hand, English for Academic Purposes (EAP) centers on the teaching of language skills and study skills for academic purposes and the emphasis of students' abilities in reading and writing (Han et al. 2021). Occasionally, it was noted in the interviews that there were assignments in the master programmes among the respondents and interviewees that did not require research and citations from primary and/or secondary sources. This corresponds to what one interviewee aforementioned that there was no English for Academic Purposes (EAP) as a subject back to her academic studies experience in Australia. This is not accommodation of different varieties of English or English for Academic Purposes (EAP) practices; this is rejection

on the basis of a "standard." Applying the "standard" on these grounds rejects more than a variety of English or particular English for Academic Purposes (EAP) practices; it rejects alternative ways of thinking and knowing while protecting the standard from hybridizing influences of the academic discourses of other Englishes (Liyanage and Walker 2014). The dominant communication style and world view of the (Western) university, variously known as "academic writing," "analytical writing," "critical thinking," or just plain "good writing," is based on assumptions and habits of mind that are derived from Western culture, and that this way of thinking and communicating is considered the most sophisticated, intelligent, and efficient by only a tiny fraction of the world's people (Liyanage and Walker 2014).

4.4 Perception Over the Usefulness of Academic English in General and English for Academic Purposes (EAP) in the Master Degrees in Less Familiar Fields

Regarding the usefulness of Academic English in general, a vast majority respondents (91.6%) reckoned that Academic English is useful in general. Half of them (50%) believed Academic English is absolutely useful, followed by one third (33.3%) claimed that the subject is useful to a large extent, while less than one-fifth (16.6%) commented that Academic English is somehow useful to a small extent. However, none of the respondents thought the subject is useless (Fig. 5).

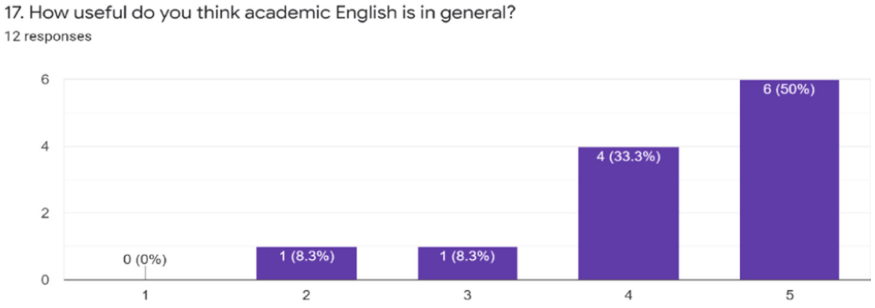

Fig. 5. The perception of usefulness of Academic English in general

When respondents were surveyed regarding the usefulness of English for Academic Purposes (EAP) in supporting the master undergraduates to accomplish the master programmes in less familiar fields, a majority (66.6.%) of them reckoned English for Academic Purposes (EAP) was essential to their pursuit of the master programmes, with more than half (58.3%) strongly agreed that English for Academic Purposes (EAP) was extremely and highly effective in supporting their master studies even the disciplines were less familiar to them. 8.3% regarded it as helpful to a certain extent and only a small minority (16.7%) believed that it was in fact useful. Another small minority (16.7%) totally disagreed that English for Academic Purposes (EAP) was helpful throughout their master degree programmes (Fig. 6).

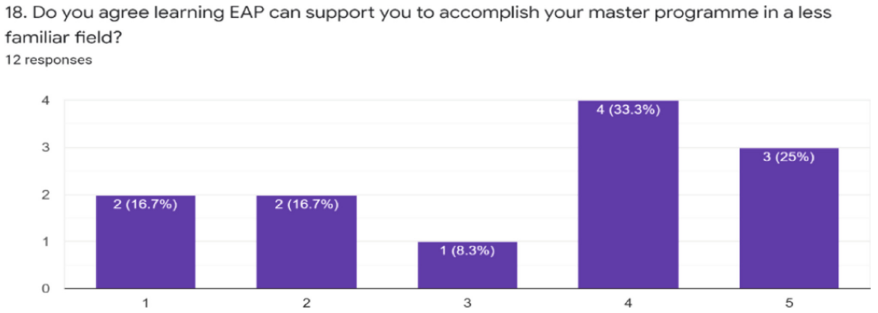

Fig. 6. Perceptions of the usefulness of English for Academic Purposes (EAP) in supporting the pursuit of master degrees in less familiar subjects

4.5 Perception Over the Usefulness of English for Academic Purposes (EAP) in the Bachelor Degree Level

Meanwhile, data was also collected concerning the usefulness of English for Academic Purposes (EAP) for bachelor degree programmes. A vast majority (83.3%) correlated English for Academic Purposes (EAP) to the writing experience in their bachelor degrees (Fig. 7), while a majority (75%) felt English for Academic Purposes (EAP) was constructive in their speaking experience in the bachelor studies (Fig. 8). On the other hand, 16.7% disagreed that English for Academic Purposes (EAP) helped equip learners to write and speak better recounting their learning experience in bachelor degrees and master degrees respectively (Fig. 7 and Fig. 8).

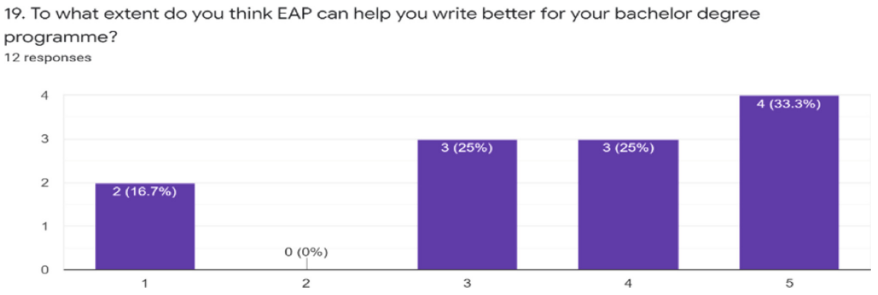

Fig. 7. Perceptions of English for Academic Purposes (EAP) in helping learners to write better in bachelor degrees

4.6 Perception of English for Academic Purposes (EAP) as a University Curriculum

From the interviews conducted with reference to the perceptions of studying English for Academic Purposes (EAP) as a university curriculum in Hong Kong and overseas, the interview results were diversified. From the interviewees who accomplished their master

Fig. 8. Perceptions of English for Academic Purposes (EAP) in helping learners to speak better in master degrees

and bachelor degrees in Hong Kong and overseas, namely Australia, Canada, the United Kingdom, and Japan, most disagreed with the idea of retaining English for Academic Purposes (EAP) as a compulsory subject taking the consideration of the dependence on the variety of nature of the different disciplines and programmes. Despite the agreement that "English for Academic Purposes (EAP) is fundamental", there is an opposing view that the subject should be made selective, based on the ground that "turning it into compulsory might be a waste of precious time. It can only be trained through lots of reading and writing throughout the whole programme, not by a course". Some also held the view that English for Academic Purposes (EAP) should be trained among freshmen in bachelor degrees, with the explanation that "people with poor English should learn separately without impacting others". In contrast, another group advocated that English for Academic Purposes (EAP) is recommended to be a compulsory subject for both bachelor and master degrees, which is "absolutely necessary and I wish back then I had a subject like this. Would have helped a great deal". Some also revealed that studying English for Academic Purposes (EAP) in master programmes "would be helpful for those who did not do it in the bachelor degrees but that academic English seems increasingly unnecessary nowadays especially in Hong Kong". A handful of interviewees claimed that they were "not sure if they understood what EPA was. Therefore, it was hard to comment on this question but they recalled that they had no English for Academic Purpose (EAP) subject in the past but they managed to do general English courses well in both bachelor and master degree programmes. Some even said that they had never heard of English for Academic Purposes (EAP) before.

From the above findings, it can be generalized that the perception of the usefulness and effectiveness of English for Academic Purposes (EAP) among master graduates in the less familiar fields from their bachelor degrees depends on the prior subject knowledge in the bachelor degrees and whether English for Academic Purposes (EAP) had been incorporated in their undergraduate programmes. In addition, the nature of the disciplines and discourses in their master degree programmes is a crucial factor to determine learners' perceptions over the necessity of English for Academic Purposes (EAP). Despite most learners believed that English for Academic Purposes (EAP) could help them write and speak better, they were not aware of the differences in academic registry and style in written and spoken language between Academic English and formal

general English, which are two different sets of discourses, contexts and criteria aforementioned. Despite these differences, some countries, such as the United Kingdom, are recruiting general English teachers to teach English for Academic Purposes (EAP) due to the shared Communicative Language Teaching philosophy of Academic English and general English. In such circumstances, teachers are likely to face various challenges such as the lack of specialized English for Academic Purposes (EAP) knowledge and academic conventions when transiting to teach Academic English from general English (Han et al. 2021), just like students switching to less familiar fields in master degree programmes. As students switch between such disciplines, course units, modules and tutors, different assumptions about the nature of writing, related to different epistemological presuppositions about the nature of academic knowledge and learning, are being brought to bear, often implicitly, on the specific writing requirements of their assignments (Lea and Street 1998b).

5 Conclusions

Delving into participants' learning experience, this research concludes a majority of master degree graduates recognize the importance of English for Academic Purposes (EAP) when they switch to less familiar subjects that are different from their bachelor degrees. It is suggested that freshmen who are new to their own discipline should be trained in their bachelor degrees for Academic English to further their academic studies later. When the surveyed master undergraduates articulated into fields that they were not familiar with, most of them relied on self-study through the negotiation between study skills and academic literacy, by seeking help around, consulting academic journals and lexis dictionaries to self-learn rather than relying on their instructors, unlike bachelor degree undergraduates. All these psychological behaviours indicate their internalization and cognitive understanding that Academic English should be tied to academic conventions. However, some of them were not aware of the subtle differences between Academic English and general English. It is also recommended that English for Academic Purposes (EAP) should be made as a compulsory curriculum in Hong Kong and overseas for freshmen in bachelor degrees, but a selective subject for master undergraduates.

Projecting on the preliminary results of this study, limitations are noted for future research directions. Despite the fact that the respondents are all master degree graduates specialized in diversified disciplines from different global regions, the research can be extended to data collection from university teachers who teach Academic English and general English in bachelor and master degree levels. Micro studies can be conducted by taking the variants between native English writers and speakers as a key determinator, whose linguistic literacy and psychological perceptions over Academic English and general English can be compared to master graduates who acquire English as a second language with reference to their learning outcomes.

Appendix

Interview Instrument

1. What master programme did you study before? Which year? Full-time or part-time? Where?
2. What was your bachelor degree programme? Which year? Where? Was it related to the content of your master programme?
3. Do you know what is English for Academic Purposes (EAP)?
4. How do you understand English for Academic Purposes (EAP)?
5. What was/were the assignment(s) and/exam(s) that required you to write/speak English in an academic way in your bachelor degree?
6. What was/were the assignment(s) and/exam(s) that required you to write/speak English in an academic way in your master degree?
7. What did you do to cope with the difficulty to understand the language in a less familiar subject in your master programme?
8. Did you need to switch to EAP in your master programme?
9. How useful do you think academic English is in general? Absolutely To a large extent To a certain extent To a small extent Definitely not
10. Do you agree learning EAP can support you to accomplish your master programme in a less familiar field? Totally agree Highly agree Somehow agree Quite agree Disagree Totally disagree
11. To what extent do you think EAP can help you write better for your bachelor degree programme? Totally agree Highly agree Somehow agree Quite agree Disagree Totally disagree
12. To what extent do you think EAP can help you speak better for your bachelor degree programme? Totally agree Highly agree Somehow agree Quite agree Disagree Totally disagree

(*continued*)

(*continued*)

13. To what extent do you think EAP can help you write better for your master degree programme? Totally agree Highly agree Somehow agree Quite agree Disagree Totally disagree
14. To what extent do you think EAP can help you speak better for your master degree programme? Totally agree Highly agree Somehow agree Quite agree Disagree Totally disagree

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Lecturers' Practices and Perceptions on the Effectiveness of Feedback in the Assessment of Academic Writing in Hong Kong

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Abstract. For students across the global community, the disruptive effects of Covid-19 had a radical and transformative impact on higher education, redirecting classes, learning practices, and institutional procedures (Tam 2021). For the lecturers responsible for student achievement and academic development, the distinction between traditional, in-classroom pedagogy and the disparate and divided outcomes of distance learning has had a significant impact on teacher approaches and role definitions. The resultant transition from traditional to digital learning has had a profound effect on several key dimensions of the educational experience including the learning and knowledge acquisition phase, the lecturing and information communication phase, and the assessment phase. This study was undertaken to critically assess this phenomenon, weighing the recent challenges of digital coursework and remote learning against the complexities of teacher assessment and feedback communication in academic writing exercises at Hong Kong higher education institutions.

Keywords: Academic writing · Feedback · Perceptions

1 Introduction

The current investigation was undertaken to critically assess the impact of Covid-19 on lecturer strategies and assessment procedures in Hong Kong-based higher education courses. Through a mixed methods approach, this study has weighed both student and lecturer feedback to highlight the complex relationship between student learning needs and lecturer strategies. The combinative focus and synthesis of key theories and critical concepts from secondary sources with such primary insights has allowed a critical review of the current and evolving status of lecturing and assessment strategies in practice. Through an in-depth, multi-faceted approach, this study has identified several areas of opportunity for future adaptation and inclusion of educator best practices for higher education digital learning systems.

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2 Aims of the Study

The primary aim of this study was to critically assess the approaches to and effects of lecturer feedback on student learning and development in academic writing at Hong Kong higher education institutions to propose strategies for improving the scaffolding effects of teacher- student assessment and improve the effectiveness and competency of student performance over time. In pursuing this aim, the following core research objectives have been accomplished:

- To critically assess the methods and expectations of academic writing assessment in higher education settings.
- To analyse the transfer effects of teacher assessment to student competency and capabilities in academic writing exercises.
- To evaluate the experiences of Hong Kong students with academic writing assessment during the past year of digital and hybrid instruction during Covid-19.
- To propose strategies for improving assessment practices and strategies for future English language education applications.

3 Literature Review

3.1 Background to Feedback and Student Support

As an instrument of educational support, Jackson et al. (2021, p.2) define feedback as 'information…intended to inform a receiver about the quality of their work in order for them to be able to see where improvements might occur.' Due to the nature of educational communication, such feedback may vary in form, including overt/covert, implicit/explicit, solicited/uninvited, and actively/passively deliveries (Jackson et al. 2021). Despite its constructs, Yusof et al. (2012) concur that academic feedback must follow several critical traits including appropriateness, timeliness, and constructiveness. Underscoring the complexity of modern educational systems, the capacity to receive and interpret feedback on academic writing is an important antecedent to student learning and development (Yu and Liu 2021). From a conceptual proposition, this competency known as feedback literacy is defined by Sutton (2012, p.31) as 'the ability to read, interpret, and use written feedback.' To be literate in processing feedback, students should understand the how and what of the feedback being communicated, they should be able to structure their learner identity using feedback to improve self-confidence, and they should cultivate their ability to read, process, and interpret feedback in productive, academically-affirming ways (Sutton 2012).

Scaffolding is defined as 'learner support usually through facilitated intervention, pedagogy, or designed learning environments' that is used to reinforce key concepts or competencies such as academic writing' (Harris 2008, p.315). Whilst scaffolding is inherently linked to traditional educational systems, as modern institutions evolve towards hybrid and integrated solutions, the role of peer support and self-reflection in scaffolding academic skillsets is increasingly important (Harris 2008). Huisman et al. (2018, p.956) propose supplementing teacher feedback with peer conversations and insights in order to stimulate students to 'actively consider the task specific processes

and criteria' of the assignment or exercise. By participating in what Huisman et al. (2018) identify as problem detection exercises, students not only develop experience in identifying and recognising problematic writing, but may identify various revision strategies or techniques that they can apply to their own writing. Where learning objectives are targeted (e.g. critical thinking, task performance, knowledge base), the relationship between teaching practices and student reflection is an important antecedent to what Carter et al. (2017, p.74) identify as the 'self-aware, skilled, engaged, and autonomous' practitioner. Ghazal et al. (2018) view these forms of outcome-oriented student proficiency as a scaffold to future learner proficiency, both at school and beyond in career-level settings.

3.2 Student Learning Needs and Achievement

In order for students to achieve feedback literacy, Yu and Liu (2021) propose a model in which individual agency forms a critical pillar in facilitating reflective, proactive, and independent review of teacher insights and commentary on academic writing. The critical role of identity framing in educational contexts is an essential antecedent to the capacity to effectively process feedback and comprises a core foundation for individual confidence and capacity to regulate emotional responses (Yu and Liu 2021). At the core of self-regulatory theory in EFL essay writing is a need for metacognitive support through confidence-building and goal- orientation (Wan 2014). Presented as a form of writer's journey, Wan (2014) suggests that educators can utilise metaphors and abstractions to support students in overcoming complex concepts, linking phenomenological thinking and vividness to the structure of effective communication. Alternatively, technical solutions such as performance models, standard forms, and learning objectives provide the scaffolding solutions needed to direct student performance towards a more productive, teacher-supported outcome (Yu and Liu 2021).

A critical problem in academic writing, Sarid et al. (2021) recognise that student procrastination is often magnified by differences in assessment and feedback techniques adopted by the teacher. Through an empirical assessment of the contrast between EFL and first language speakers, the researchers observed varying frustrations as a result of perceived fairness, particularly when EFL students were unable to convey their ideas in the appropriate and grammatically correct English (Sarid et al. 2021). As a result, when written feedback was expected to be critical or was difficult for the EFL students to apply to their writing methods, students were more likely to procrastinate on writing projects and may limit their efforts in draft re-writing or rework (Sarid et al. 2021). Importantly, this same pattern of behaviour was not observed amongst first language English speakers or EFL students who had achieved later-year status and were more confident in their abilities (Sarid et al. 2021). In many cases, Gaskell and Cobb (2004) recognise that L2 writer errors are based upon common patterns or variations that can be mitigated through concordance learning. Although teaching grammatical patterning and amending interlanguage grammar gaps and deficiencies may present a challenge, experience and concordance exampling prior to essay writing has been shown to improve student proficiency in English L2 writing (Gaskell and Cobb 2004).

3.3 Assessment Effects and Strategies

There is an underlying expectation that assessments will mirror coursework. Tam (2021) has demonstrated that when student expectations differ from the actual assessment (e.g. essay work instead of quantitative analysis), the disconfirmation effect is likely to have a negative impact on student proficiency and performance. During Covid-19, for example, a period in which proctored examinations were shifted online to facilitate remote assessment, the alignment between these remote expectations and coursework played a critical role in student responses (positive or negative) (Tam 2021). By combining outside assessment and feedback solutions with personal validation and self-judgment, Ling et al. (2021) suggest that specific dimensions of academic writing can be reinforced and validated according to confidence-supporting alignment between intrinsic and extrinsic feedback. Through goal-setting and comparative writing exercises, students learn to evolve their writing competency through productive, critical tasks that not only rely upon external critiques, but encourage self-assessment and reflection to reinforce key goals and competencies (Kim and Kim 2017).

A critical challenge in the assessment of academic writing, linguistic usage, is magnified by the globalisation of educational systems and a growing number of diversified students (Man et al. 2020). For higher education analysis, a review of Masters' level dissertation assessment by multiple tutors revealed emphasis on linguistic elements, structural consistency, and reference formatting, often neglecting the accuracy and originality of the ideas expressed within the essay itself (Man et al. 2020). To overcome such gaps and competency challenges, Ghazal et al. (2018) propose a form of feedforward strategy that bridges knowledge and competency gaps by emphasising clarity and depth in the project instructions. Further, students are supported throughout their draft phase completion process by receiving proactive feedback in earlier phases (e.g. multiple drafts) of their project rather than awaiting assessment before engaging in rework and resubmission (Ghazal et al. 2018).

Whilst many feedback-related techniques focus on direct feedback (e.g. Sarid et al. 2021) or student assessment (e.g. Huisman et al. 2018), there are alternative approaches that can be considered when designing writing feedback solutions. A hybridised solution is proposed by Chen and Chin (2014) that integrates both tutor and peer feedback on interactive projects that encourage individual work in group-based settings. By sharing group responsibility for goal achievement and appraisal, students establish their position and role in the constructive exchange, improving their overall receptivity to both student and tutor feedback on their own written projects (Chen and Chin 2014). With many courses shifting to a hybridised, digital/traditional format, Yusof et al. (2012) observe that the combination of formal teacher feedback with informal peer feedback extends the assessment cycle, reinforcing positive dimensions of their academic efforts, whilst highlighting areas in which one or more students might be making the same mistakes. Social media, for example, offers a scaffolding mechanism that allows for a transition from peer to teacher feedback across collaborative channels that can mediate the accessibility of support in more formal systems (e.g. one-on-one availability, direct communication).

4 Research Methodology

4.1 Research Paradigm

Throughout the field of research surrounding social problems and educational theories, there are a variety of perspectives or paradigms which determine the researcher's approach to problem assessment and interpretation (Bryman 2015). The positivist paradigm, for example, represents a structured and scientific approach to the pursuit of knowledge that can be replicated in future studies through targeted, predominately quantitative research techniques (Jonker and Pennink 2010). For this type of studies, positivism would involve a survey or performance assessment, considerations that were weighed during the selection process. The constructivist or interpretivist paradigm, alternatively, is adaptive and allows for individuals to narrate their own experiences or observations through the collection of primary evidence via open-ended instruments (Jonker and Pennink 2010). When weighed against the current problem of feedback interpretation and experiences, this approach was determined to offer the best fit solution for the current study, allowing the research to evolve organically out of the comparison of individual perceptions and experiences related to the effectiveness of the academic writing feedback cycle.

4.2 Research Approach

By selecting the constructivist paradigm, this study adopted a purely qualitative approach to the collection and analysis of primary evidence. There were several stages to this approach including the design of the research instrument, the identification of the interview participants, the administration of the interviews, and the collection and analysis of the findings. The interview was designed to encompass all of the primary conceptual themes presented in the literature review, drawing upon the foundation of prior academic theories and findings to ground this research through empirical targeting (Glaser 2017). The instrument included the following core sections to which each of the 10 open-ended questions were assigned:

- Section 1: (Q1, Q2, Q3)
- Section 2: (Q4, Q5, Q6)
- Section 3: (Q7, Q8)
- Section 4: (Q9, Q10)

The instrument involved multi-part prompts that encouraged the participants to weigh their responses and consider their answers in relation to the underlying themes. By recording the feedback and then comparing the responses using appropriate qualitative techniques, it was possible to apply inductive reasoning to the disparate spectrum of student and teacher insights (Merriam 2015).

4.3 Sampling and Participant Selection

The primary objective of this study was to capture primary evidence regarding student experiences with in-classroom feedback strategies, weighing the effectiveness of particular techniques against the recent pressures of Covid-19 and digital learning. Therefore,

the sample targeted for this study was a representative population of students with direct experience with the assessment of academic writing in Hong Kong higher education institutions during the past year. Bryman (2015) recognises that when a sample is known or the population is defined by its underlying traits or characteristics, then a non-probabilistic approach which applies specific inclusion criteria to the sampling procedure is needed. For this study, therefore, this technique involved adopting the following core conditions subdivided into inclusion/exclusion criteria in Table 1.

Table 1. Inclusion and exclusion criteria for interview participation

Inclusion	Exclusion
Students or Lecturers attending Hong Kong higher education institutions	Students or Lecturers from other geographic locations or in other educational institutions
Students or Lecturers completing English Writing courses	Students or Lecturers completing other courses
Existing Students or Lecturers with at least 1 year of educational/ teaching experience	New or non-current Students/Lecturers without ongoing experience
Willing to complete interview remotely using appropriate digital technologies	Unwilling or unable to complete interview remotely

Based upon this criteria, a sample of 8 individuals (5 students and 3 lecturers) who met all of the inclusion criteria was identified. Each individual agreed to complete the interview remotely using Zoom, Skype, or a telephone. The feedback was recorded verbatim and then transcribed using digital transcription technologies to allow for comparability and analysis. Each interview lasted for approximately 20 min, with additional time provided in cases where student responses were longer or additional clarity was needed.

4.4 Data Analysis

The output of this qualitative interview approach was a series of open-ended responses to a 10-question interview that allowed for variability and inconsistency. Therefore, to analyse these findings, King and Horrocks (2010) suggest that a form of thematic, insight-based comparison mechanism is needed. Such techniques typically involve separating the feedback into its key thematic elements, weighting the significance of particular variables or dimensions against the grouped perceptions of other participants (King and Horrocks 2010). Merriam's (2015) analytical thematic coding technique utilises a line-by-line analysis to perform such research, extrapolating insights and representative feedback from direct comparisons between individual and grouped responses. This technique was adopted for this study, applying a line-by- line thematic coding exercise to each of the 10 questions, and subsequently reporting the results according to their similarity or distance from this central thematic code.

4.5 Ethical Concerns

The evidence collected from these educational stakeholders reflects personal and professional data that has the potential to expose individuals to broader scrutiny and criticism. Therefore, ethical controls were introduced to not only protect the identities and exposure of these participants, but to maintain the reliability and consistency of their feedback throughout the analytical procedure (Punch 2014). Specifically, all participants were asked to agree to several terms that were provided to them in an initial query letter to attain what Hammersley and Trainou (2012) recognise is a critical condition of ethical responsibility: informed consent. By consenting to these terms, the participants agreed that they would remain anonymous throughout this process, that their responses would not include any specific or revealing evidence about their position or status at college, and that they were engaging in an at-will process and could exit the interview at any time (Babbie 2015). Once the results were collected and transcribed, any accidental identifying elements were replaced with generic placeholders, and the analysis was conducted systematically to reduce the possibility of researcher interference or data manipulation.

4.6 Findings

The interview form was comprised of 10 open-ended questions that were administered to 5 students and 3 teachers of Hong Kong higher education institutions in academic writing programmes (refer to *Appendices A and B*). The results were recorded and analysed thematically following the completion of the administration period. The following sections subdivide these questions into 4 broad thematic categories, whilst further distilling the results into their underlying major thematic elements to facilitate interpretation. The end result is an analytical model that highlights the key factors and insights related to the participant responses.

Questions 1, 2, 3: Overview to Teacher Feedback.

Q1) What role do you feel that teacher feedback plays in academic writing exercises? Q2) Do you believe students respond well to teacher feedback?

Q3) What are the most effective forms of feedback and how do they shape student behaviour/writing practices?

4.7 Major Themes: Support, Guidance, Direction, Improvement, Critiquing, Language, Structure, Interpretation, Themes, Model

These first three questions were designed to explore the background to teacher feedback in academic writing experienced by these students and the representative teachers in this sample. As evidenced from the major thematic elements reflected in the responses, the role of teacher participation was identified as one of support and guidance, with other actions such as critiquing and structural insights reflecting the broader expectations of what SP1 identified as improvements in the form and structure of what have been produced and where are headed in the essay (Wong et al., personal communication, Nov 10, 2021). Highlighting the effects of such support on student behaviour, SP4 argued whether it is a situational type of response; are they being overly critical, or are their comments supportive and constructive. Whilst it could be argued that few students would

respond positively to such feedback, TP1 recognised that '*in some cases, teachers see feedback as their chance to eliminate bad behaviours by pointing out deficiencies' and this can be 'very heavy and may have adverse effects on student responses'* (Wong et al., personal communication, Nov 10, 2021). This concept of '*negative'* (SP2), '*attacking'* (SP3), or '*reductive'* (SP5) feedback techniques was rejected by the students, and in response, TP3 recognised that '*our goal is not to damage student ego or motivation, but to encourage proper form and register'*, which may be difficult for some students at first, but it can be seen as a layering process that improves outcomes over time (Wong et al., personal communication, Nov 10, 2021). To make such outcomes more effective, SP1 indicated that '*teachers should use positive language and supportive guidance to encourage motivated student responses.'* Similarly, TP2 argued that '*It's always about communicating the strengths of the product alongside areas of opportunity;* and it's not about *'nit-picking or attacking student competency or language mastery; positive, supportive, encouraging'* (Wong et al., personal communication, Nov 10, 2021).

Questions 4, 5, 6: Feedback and Academic Writing Execution

Q4) What do you feel are the greatest challenges facing students in university-level academic writing courses?

Q5) What resources or support systems can be used to assist students in writing proficiency?

Q6) How clear are student expectations regarding the assessment/feedback procedure, and what can be done to improve such expectations?

4.8 Major Themes: Criticism, Challenges, Ambiguity, Uncertainty, Goals, Skills, Foundations, Scaffolding, Development, Language

These three questions focused on student development hurdles and the role of feedback in assisting academic writing competency. SP5 reflected that it is hard to be *'confronted with a range of unclear expectations and guidelines'* since *'every project is different, every essay the structure changes'* (Wong et al., personal communication, Nov 10, 2021). Highlighting similar concerns, SP2 indicated that it is hard to start over again as the feedback were completely different from his expectations despite he believed he had followed the guidelines. In assessing why such outcomes might be manifesting, TP2 reported that '*a lot of students enter the programme without the academic writing skillset to engage language and style in their writing efforts'* (Wong et al., personal communication, Nov 10, 2021). He also reviewed that these students had been coddled and cushioned through their education. To overcome such gaps and limitations, TP1 reported that they viewed the writing process as iterative, so they started by layering in skills and by the end of the course, they should be at a level of mastery; if not, then they had failed. Despite such commitments, TP3 indicated that '*students are not always equipped to deal with challenges; so there is a need for a lot of one-on-one support and direct feedback to try to overcome such barriers'* (Wong et al., personal communication, Nov 10, 2021). Given these skills-specific hurdles, SP3 reported that in relation to expectations, '*there is just this ambiguity that makes feedback feel unclear or challenging; why can't they just say what they mean? Why are we responsible for interpreting teacher feedback?* (Wong et al., personal communication, Nov 10, 2021). Similarly, SP4 reported that '*I feel like a lot of the feedback is for the tutor's sake, maybe to show that they know the tools or the*

concepts better than us? It's unfair, really" (Wong et al., personal communication, Nov 10, 2021). TP2 argued in contrast, however that '*the expectations are very clear, and the feedback should confirm what we are giving as learning objectives and project goals to the students, it's not a surprise'* (Wong et al., personal communication, Nov 10, 2021).

Questions 8, 9: Peer Support and Feedback Solutions.

Q8) What role should peer feedback play in supporting academic writing? Was this impacted by Covid-19?

Q9) How can peer feedback support student writing competency? How can it damage it, and how should teachers address such possible pitfalls?

4.9 Major Themes: Support, Guidance, Exchange, Feedback, Insights, Critique, Learning, Development

In response to both of these queries, there was a unanimous expectation that '*peer feedback allows students to learn new skills and strategies by reviewing the strengths and weaknesses of their peers'* (TP2) (Wong et al., personal communication, Nov 10, 2021). In fact, from a student perspective, SP1 reported that '*this is about learning from each other and building our own strengths off of the gaps that other students help us to see.'* The support for peer feedback was based upon '*someone at the same level who is struggling with the same things reflecting on the goals or objectives of the project'* (SP4) (Wong et al., personal communication, Nov 10, 2021). When considering potentially negative effects, TP1 did caution, however that '*peer feedback can be extremely positive; but when students get defensive, then their reading may become hyper critical, and you've got a situation of the blind leading the blind.'* In such cases, therefore, TP3 reported that '*the teacher's role is both moderator and guide, supporting all students in achieving positive progress in skill and writing competency, while also encouraging critical thinking'* (Wong et al., personal communication, Nov 10, 2021).

Question 10: Summary Insights.

Q10) What approaches would you recommend to feedback delivery in the future to improve the effectiveness and positivity of student responses?

4.10 Major Themes: Engagement, Communication, Specificity, Goal-Setting, Direct, Feedback, Targeting

The final question was answered in varied form, with students encouraging '*more constructive feedback with specific guidelines, less uncertainty'* (SP3) and teachers suggesting that '*we need more one-on-one time and direct student support opportunities'* (TP2) (Wong et al., personal communication, Nov 10, 2021). Whereas the intentions of both groups were similar, SP4 suggested that '*I would appreciate less emphasis on language issues and more focus on concepts and big picture strengths and weaknesses, how am I doing overall?'* (Wong et al., personal communication, Nov 10, 2021). In fact, SP1 reported the same expectation, suggesting that *'there is too much emphasis on the language; this is not an English course, it is a writing course, so am I getting the ideas across? I need to know what to strengthen, not just grammar*.' Based upon this contrast of purposes, TP1 indicated that '*students who lack particular skillsets may feel attacked,*

but this is about progression over time, so I expect positive growth supported by feedback and constructive criticism.' TP3 argued that '*it is about goal-setting, and without specific goals, students are going to keep spiralling in the same bad habits'* (Wong et al., personal communication, Nov 10, 2021).

4.11 Thematic Synthesis

Once all of the results had been captured, a summary model (See Table 2) was generated from the synthesis of the participant responses, highlighting several major thematic elements, the underling categories associated with those themes, and the representational sentiment from the participants in this study. Each of these three major thematic categories spawned additional downstream classifications which were reflected in the insights and sentiments offered by both student and teacher participants. These findings will be discussed in greater details in the following chapter.

Table 2. Thematic synthesis of participant responses

Major themes	Categorical classifications	Insights/Sentiment
Feedback	Support	Positive, communicative, driven, focused, goal-oriented
	Damaging	Critical, ambiguous, negative, disorienting, non-specific, generic
	Peer	Comparable, similar, dialogic, engaging, examples, reflective
Delivery	Direct	Personal, specific, communicative
	Indirect	Uncertainty, limitations, understanding, form, strategy, goals
Needs/Opportunities	Communication	Clarity, expectations, focusing, targets, goal-setting, purpose, improvement
	Skills/Competencies	Iterative, development, long-term, course, structured

5 Discussion and Conclusions

This study began with the acknowledgement of feedback as both a positive and negative force in academic writing courses. The insights retrieved from these participants have confirmed that when applied effectively, feedback can have highly constructive effects, directing students towards improvement and self-efficacy in writing competencies and best practices. In exploring the productive influence of feedback, Jackson et al. (2021) acknowledge that for higher education students, there is an expectation of discipline and professionalism that requires rigorous and targeted communication to support the realisation of long-term educational objectives. Tutors, in this relationship, therefore, evolve

into coaches and supportive counsellors who are seeking to inspire behaviours that mirror the broader academic register and competency of other similarly qualified degree holders (Jackson et al. 2021). The teachers in this study have communicated a similar expectation, whereby coaching and supporting on key learning objectives becomes a priority and other minority elements such as grammar and language learning are secondary considerations.

Due to the change in staff-related interactions during Covid-19, the loss of face-to-face communication and course-balanced feedback cycles led to a digitally-restricted communication cycle that has negatively impacted the transparency of such participant experiences. Factors during the assessment period such as time constraints, resource availability, and skill and competency have been shown by Tam (2021) to have moderative effects on student confidence and proficiency in at-home assessment and essay writing. Further, Man et al. (2020) have demonstrated that when students are engaging in English dominant courses as foreign or EFL students, their risk for exclusion due to linguistic barriers (rather than conceptual or idealistic) is significant. Teacher bias towards English accuracy and grammatical proficiency not only dilutes any emphasis placed upon topic or concepts, but it negates the breadth of the research and investigative value in favour of linguistic criticism (Man et al. 2020). Such biases were highlighted by these participants and identified as negative feedback effects that can damage student confidence and confuse more productive writing objectives.

Where tutors adopt negative criticism as a mode of feedback, the students in this study reported demotivational outcomes that are likely to lead to dissatisfaction and resistance to self- improvement and development. As evidenced by Sarid et al. (2021) for early-year students, the likelihood of procrastination in academic writing is magnified by negative teacher feedback and criticisms that are difficult to understand or follow. As these effects are magnified for EFL students, the consequences of miscommunication or language competency gaps are likely to be reflected in academic writing exercises, both in the early stages of the exercise itself and in rewriting exercises and post-assessment reflection (Sarid et al. 2021). As students acquire new technical skills, competency in academic writing, and understanding of teacher expectations, Yu and Liu (2021) demonstrate a progressive realisation of self-efficacy and confidence that has positive effects on feedback literacy and responsiveness. There was a common expectation amongst these educators that academic writing was an integrative discipline that would be improved over time as students learned new skills and competencies.

There was a definite consensus amongst the participant feedback that in order to be effective, feedback must align with student expectations, connecting teacher communication to manageable and amendable transformations. Therefore, student preparedness such as concordance exercises (see Gaskell and Cobb 2004) or collaborative, peer exchanges are needed to reinforce specific goals and priorities in the academic writing course. The peer-supported problem detection exercises proposed by Huisman et al. (2018) for example adopt a self- development solution that relies upon the transference of writing proficiency through experiential and systemic practices. Alternatively, Chen and Chin (2014) propose that teachers develop cooperative feedback systems to integrate peer feedback cycles into the learning process for academic writing. These exercises utilise a form of cooperative skills testing and development procedure that

allows teacher feedback to become supportive rather than negative or demotivational (Chen and Chin 2014).

Ultimately, the evidence confirmed that where students experience ambiguity or uncertainty in the feedback provided by these writing instructors, they are likely to resist self-improvement and instead seek out blame and target frustration towards the teachers themselves. For instructors in a post-Covid-19 era, there is a lingering question regarding role and identity in administration and assessment of courses that are digitally architected and structurally rather than relationally managed (Tam 2021). Comas-Quinn (2011) has proposed that identity framing in digital education is an important predictor of teacher proficiency, particularly as barriers between technological and conceptual skill sets challenge teacher-student interactions and support-based outcomes. As support agents, counsellors, and active student supporters, it was evident from the teacher responses that the intention behind such educational experiences is fundamentally linked to positive teacher roles; and therefore, will need to continue to evolve over time through more creative and immersive teacher-student exchanges.

6 Conclusions

The primary aim of this study was to critically assess the approaches to and effects of lecturer feedback on student learning and development in academic writing at Hong Kong higher education institutions. Through a comparative review of the extant literature in this field, it was evident that feedback plays a direct role in student self-efficacy and the metacognitive forces that shape student perceptions of writing competency and academic proficiency. Negative feedback strategies, therefore, damage student beliefs and confidences, leading to resistance to goal achievement and emphasis on narrower, structural considerations. Through an empirical review of student and teacher feedback, it was revealed that future feedback solutions need to weigh linguistic and structural considerations against broader learning objectives, targeting developmental strategies that reinforce student confidence and drive self-efficacy towards positive outcomes. Therefore, by combining direct, indirect, and peer-related feedback solutions, it is concluded that the future of academic writing support can be based upon a much more dynamic and constructive solution that supports students at all competency levels in improving their identity as an academic writer.

Appendices

Appendix A: Interview Instrument

Q1) What role do you feel that teacher feedback plays in academic writing exercises?
Q2) Do you believe students respond well to teacher feedback?
Q3) What are the most effective forms of feedback and how do they shape student behaviour/writing practices?

(*continued*)

(*continued*)

Q4) What do you feel are the greatest challenges facing students in university-level academic writing courses?
Q5) What resources or support systems can be used to assist students in writing proficiency?
Q6) How clear are student expectations regarding the assessment/feedback procedure, and what can be done to improve such expectations?
Q8) What role should peer feedback play in supporting academic writing? Was this impacted by Covid-19?
Q9) How can peer feedback support student writing competency? How can it damage it, and how should teachers address such possible pitfalls?
Q10) What approaches would you recommend to feedback delivery in the future to improve the effectiveness and positivity of student responses?

Appendix B: Transcript TP2

#	TP2
Q1) What role do you feel that teacher feedback plays in academic writing exercises?	It's essential. I mean, we are not just handing out topics and then awarding scores based upon whether we like the student or not. This is about developing a feedback system that is administered consistently to all students across all projects. It sets up expectations and it makes sure that we are clear in what we are communicating
Q2) Do you believe students respond well to teacher feedback?	Sometimes, when they don't let their ego get in the way. This is really about a one sided conversation for the most part, and I recognise that when I am giving feedback. I make sure that I am as clear as possible with my words and give concrete direction to reduce the possibility for misunderstanding. Then they seem to be more positive than if I throw out some lofty goal or big concept
Q3) What are the most effective forms of feedback and how do they shape student behaviour/writing practices?	It's always about communicating the strengths of the product alongside areas of opportunity; it's not about nit-picking or attacking student competency or language mastery; positive, supportive, encouraging, that's how I frame it. Let them know what they did right too. Don't just be the harbinger of bad news

(*continued*)

(*continued*)

#	TP2
Q4) What do you feel are the greatest challenges facing students in university-level academic writing courses?	After Covid-19, we are seeing a lot of students enter the programme without the academic writing skillset to engage language and style in their writing efforts; they have been coddled and cushioned through their education, and in practice, it is a disadvantage to them. They are lacking the skills needed for basic academic writing and it makes my job a lot harder
Q5) What resources or support systems can be used to assist students in writing proficiency?	There has to be some form of scaffolding, some type of skills development that progresses throughout secondary school and into university level study. It's about building proficiency in the language as well as in the structures and themes. They need to know how to write a basic topic sentence and then build upon that
Q6) How clear are student expectations regarding the assessment/feedback procedure, and what can be done to improve such expectations?	As long as we are doing our jobs, then the expectations are very clear, and the feedback should confirm what we are giving as learning objectives and project goals to the students, it's not a surprise. I'm always shocked by students who try to say 'oh, i didn't know I had to do that…' Yes, Billy, you did. You knew it from the day I gave you the syllabus
Q8) What role should peer feedback play in supporting academic writing? Was this impacted by Covid-19?	For the most part, peer feedback allows students to learn new skills and strategies by reviewing the strengths and weaknesses of their peers. But sometimes, it's just about flowery comments, and you end up with a lot of confused people trying to lead each other to something that makes sense
Q9) How can peer feedback support student writing competency? How can it damage it, and how should teachers address such possible pitfalls?	I think it can reinforce your self-confidence. It can build up your positive sense of achievement a bit, and it can contribute to your general self-worth in practice. Then you also have students that are overly critical for no justifiable reason. They try to prove their intelligence or their knowledge. That can be damaging
Q10) What approaches would you recommend to feedback delivery in the future to improve the effectiveness and positivity of student responses?	Given everything we've had to face with Covid-19, we need more one-on-one time and direct student support opportunities. I need to see their faces when I give them feedback. I need them to hear my words and try to write them down in their own words. Zoom is fine, but it's not real teaching, you know. It's just my digital avatar, and I want to be their physical ally

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Reflections on Online Learning and Teaching

Research on the Contributing Factors of Postgraduate Students' Online Learning Experience

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Abstract. In recent years, online learning has become a hot research issue in higher education. In order to gain insight into the actual situation of online learning for postgraduates, and explore the important factors that affect their online learning perceptions, this study adopts qualitative research methods and selects 13 graduate students of Chinese University as interview subjects, using the grounded theory to process and analyze the interview data. Research results show that the online learning experience of graduate students is jointly affected by the internal factors of the subject and external factors. Specifically, it mainly includes 11 key factors, which are teachers' online teaching ability, teachers' familiarity with technology, online course design, social interaction, network conditions, platform functions, assessment methods, course workload, intrinsic learning motivation, self-monitoring ability, and self-learning ability. Based on the research findings, we put forward four suggestions to improve the online learning experience of postgraduates.

Keywords: Postgraduates' online learning experience · Contributing factors · Qualitative research · Semi-structured interviews · Grounded theory

1 Introduction

The outbreak of COVID-19 has brought a huge impact to the teaching work of colleges. Out of the needs for epidemic prevention and control, the Chinese Ministry of Education has uniformly deployed various colleges across the country to postpone the opening of schools, and put forward the "stop classes without suspension" initiative. In this context, colleges across the country have actively carried out large-scale online teaching activities to ensure students' course learning. For a time, online learning has become the focus of attention in the academic world, and it is considered to be an important force in reforming traditional teaching forms and realizing higher education revolution (Yang et al. 2019).

However, the actual effect of online learning is far less than what people expected. The lack of motivation for students to participate in online learning, as well as the lack of peer interaction and teacher feedback make students prone to problems such as loneliness, anxiety, and poor learning effects (Khalil and Ebner 2014). Whether online learning can achieve the same learning effect as traditional classroom learning has been

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questioned by many researchers (Hu and Zhao 2015). To deal with the above-mentioned practical problems, researchers have gradually shifted from focusing on the connotation characteristics of online learning, curriculum design, and online education theories to focusing on the micro-levels of cognition, motivation, emotion, and practical experience of students' online learning. So far, online learning experience has become a hot issue in online education research.

Through combing and analyzing the relevant literature, it is found that in terms of research objects, the existing studies mostly focuses on college students but not the graduate students. In terms of research methods, quantitative analysis methods such as questionnaire surveys and literature analysis methods are mostly used, but qualitative research is lacking. There are few research investigating on the dynamic change process of online learning experience, let alone the actual situation of online learning for postgraduates, which is insufficiently grasped. Therefore, this research adopts the approach of qualitative research, aiming to gain in-depth understanding of the actual situation of the postgraduate study experience and explore the important contributing factors of the online learning experience.

This paper aims to optimize the quality of postgraduate online education and to provide some references and mirrors for the future promotion of the "online and offline" hybrid teaching model.

So, what is the actual situation of postgraduate online learning experience? What are the factors that affect their online learning experience? This research attempts to answer these questions.

2 Literature Review

Recent scholarly work with a research interest in online learning experience can be divided into two themes: (1) concept and constituent elements of online learning experience; (2) contributing factors of online learning experience, all of which provide experimental evidence establishing and shaping the theoretical framework of current research.

2.1 Concept and Constituent Elements of Online Learning Experience

The concept of "experience" originated in the field of philosophy. Philosophers generally believe that "experience" is the process of the subject's understanding and perception of the objective world, and it implies a relationship between subject and object. Subsequently, psychologists have enriched and developed this definition. In the field of psychological research, "experience" is understood as the subject's emotional response and psychological change process to related things under personal experience and in-depth understanding (Zhang and Lu 2012). The pedagogical researchers combined the definitions of philosophers and psychologists, and regarded "experience" as not only the process of the subject's understanding of the objective world, but also the cognitive and emotional results produced by the subject through activities (Li 2001).

Based on the analysis of the definition of "experience", this article defines "online learning experience" as the subject's perception and experience of the process and results

of learning activities by participating in online course learning activities in the learning field. Multi-dimensional experiences include the learning environment, online course learning, and online learning effects. In essence, the "online learning experience" is both an experience of the process and a reaction to the result. In order to further clarify the content structure of the online learning experience, this research extracts relevant information from the previous literature to determine the components of the online learning experience. Representative views on the components of the online learning experience are shown in Table 1. As can be seen from the table, previous studies have divided the components of online learning experience mainly from the following three aspects: the aspect of the experience of course environment, such as learning platform, course platform and course learning; the aspect of the experience of learning activities, such as learning behavior, community interaction and teacher-student interaction; the aspect of learner's evaluation of learning effects, such as participation feeling, online learning experience, and course evaluation. In summary, this study believes that online course environment experience, course learning activity experience and learning effect evaluation are the three important dimensions that constitute online learning experience, which lays the theoretical foundation for the design of the follow-up interview outline for this article.

Table 1. Elements of the online learning experience

Definition	Elements	Authors
MOOC learning experience	Course evaluation, learning behavior, participation experience	(He Chun et al. 2016)
Large-scale online open course learning experience	Learning platform, course learning, social interaction	(Shan and Liu 2018)
Online learning platform learning experience	Sensory experience, interactive experience, learning experience	(Liu 2019)
Online learning experience	Curriculum platform, student-student interaction, teacher-student interaction, individual learning	(Udo et al. 2011)

2.2 Factors Affecting Online Learning Experience

There are many factors that affect learners' online learning experience. Researchers have discussed the factors of online learning experience from different perspectives: for example, Jiang Yujun et al. (2019) use a survey to investigate the online learning experience of 141 college students. The results show that teacher-student interaction, peer interaction and collaboration, course tasks, teacher teaching skills, resource characteristics, and curriculum activity design are the six key factors that affect the online learning

experience. Similarly, Chen Wuyuan and Jia Wenjun (2020) use 209,099 college student questionnaires from 334 colleges and universities as research samples to evaluate online teaching. The study finds that teachers' familiarity with online platforms, and students' technical literacy and learning abilities have become important factors affecting online experience. Liu et al. (2016) explore the structural relationship between the factors that affect the learning experience of online courses through a systematic literature review, and point out that the main influencing factors include the online learning environment, student learning style, and teacher's professionalism. Murders (2017) uses phenomenological research to track and investigate the online learning experience of college students with learning disabilities, and the analysis results show that platform convenience, teacher feedback, and students' own learning motivation are the core driving factors that determine whether they continue to participate in online learning. Young (2000) discovers that the differences between individual learners, such as information literacy, learning enthusiasm and motivation, independent learning ability, self-planning and management ability, and other factors will have a certain impact on students' online learning experience. Besides, Paechter et al. (2010) take 2196 college students as the research objects and use questionnaire survey methods to conduct in-depth investigations on their online learning experience and satisfaction. The analysis results show that learners' self-regulation ability, learning motivation, and resource acquisition flexibility are the main contributing factors of online learning experience.

Throughout reviewing relevant literature, it can be found that researchers still have disputes about which factors will affect learners' online learning experience, and the research perspectives and methods are also different; a systematic research system has not yet been formed. In terms of research methods, most existing studies use questionnaires, literature analysis, and scale methods to collect data. Tthey can understand the online learning status of students to a certain extent, and explore some related factors that affect the online learning experience. However, it is unable to deeply capture the dynamic process of online learning experience changes over time and fully understand the in-depth reasons that affect online learning experience. Also, in terms of research objects, previous research mainly focuses on college students, and the subject of research is singular. Research on the online learning experience of the graduate group is relatively scarce in China and only 13 articles on online learning experiences for postgraduates are searched in the National Knowledge Infrastructure (CNKI) database, the largest and most widely recognized database in China. However, the graduate group is an indispensable part of the higher education system for online learning. The exploration of experience is especially necessary.

Therefore, based on reviewing and learning from existing research, this article adopts a qualitative research approach, taking graduate students as the survey object to gain in-depth understanding of the actual situation of their online learning experience, and reveals the important factors that affect the online learning experience of graduate students, which are helpful to optimize the quality of postgraduate online education and provide some references and mirrors for advancing the "online and offline" hybrid teaching model in the future.

3 Research Questions

This research attempts to answer these questions:

1. what is the actual situation of postgraduate online learning experience in China?
2. What factors in online learning affect Chinese postgraduate satisfaction?

4 Methodology

We conduct this qualitative study by using the interviews, and adopt grounded theory to process and analyze the interview data. As the founder of grounded theory, Glaser and Strauss (2017) believe that grounded theory is a qualitative research method for discovering and constructing theories from empirical data, that is, the process of collecting, analyzing, continuously testing and integrating data in accordance with rigorous and standardized operating procedures. This process particularly emphasizes the interaction with research objects.

4.1 Research Participants

This study adopts a purposeful sampling method and selects 13 graduate students from Nanjing University of Posts and Telecommunications as interview subjects according to research needs. All 13 interviewees have participated in the school's online courses during the winter vacation epidemic. Among them are 5 boys and 8 girls; ages range from 22 to 26 years old; 4 postgraduates majoring in education technology, 3 postgraduates majoring in higher education, 4 postgraduates majoring in electronic information, 1 postgraduate majoring in chemistry, 1 postgraduate majoring in computer application technology. Due to the limitations of objective conditions, this study tries to balance men and women, age ranges, arts and science majors, but there are still certain limitations. The specific information of the interviewees is shown in Table 2.

Table 2. Participants' demographic information

Participant	Gender	Age	Education	Major	Online learning experience
S01	Female	25 years old	Postgraduate	Education technology	4 months
S02	Male	24 years old	Postgraduate	Education technology	2 months

(*continued*)

Table 2. (*continued*)

Participant	Gender	Age	Education	Major	Online learning experience
S03	Female	25 years old	Postgraduate	Higher education	2 months
S04	Male	22 years old	Postgraduate	Electronic information	3 months
S05	Female	24 years old	Postgraduate	Education technology	2 months
S06	Female	25 years old	Postgraduate	Higher education	2 months
S07	Male	23 years old	Postgraduate	Electronic information	3 months
S08	Female	26 years old	Postgraduate	Education technology	2 months
S09	Male	24 years old	Postgraduate	Electronic information	3 months
S10	Female	23 years old	Postgraduate	Electronic information	3 months
S11	Female	24 years old	Postgraduate	Chemistry	2 months
S12	Female	23 years old	Postgraduate	Higher education	2 months
S13	Male	25 years old	Postgraduate	Computer technology	2 months

4.2 Data Collection

We used a semi-structured interview method to interview 13 graduate students one by one to collect data. The interview forms are face-to-face interviews and online videos. The interview content is mainly composed of two parts. The first part aims to know about the interviewee's personal background information, online learning time, etc. The second part focuses on a comprehensive understanding of the respondents' actual experience of participating in online course learning, and their attitudes and views on online learning. Before the interview, in order to enable the interviewees to better understand and answer the interview questions, the researcher briefly explained the purpose of this research to the interviewees and briefly explained the definition of the online learning experience. During the interview, the researcher recorded the content of the interview and took notes with the consent of the interviewees. The duration of each interview ranges from 30 min to 60 min.

4.3 Data Analysis

After the interview, we transcribed 13 interview recordings into 20,000-character manuscripts. After preliminary deletion of sentences that are irrelevant or unclear to the study, the manuscripts are imported into Nvivo12 software for coding. The operation process strictly follows the grounded-theory's "open coding-axial coding-selective coding" three-level coding method to process the data. Part of the interview coding is shown in Table 3.

Table 3. Coding table of data

Selective coding **(Number of nodes)**	Axis coding **(Number of nodes)**	Open coding **(Number of nodes)**	Representative viewpoints of interviewees
External contributing factors of online learning experience (126 nodes)	Teacher (84 nodes)	Teaching ability (23 nodes)	My online learning experience is not good…. Teacher's teaching ability is very important. Sometimes he is very excited when he speaks alone, but we don't understand, and then the teacher keeps talking, regardless of whether students understand it or not. (S04)
		Familiarity with technology (12 nodes)	My online learning experience is not good…. One reason is that some teachers start to use the online platform and are not very familiar with how to operate. When students want to speak, ~~but~~ the teachers don't know how to use the talk function of the platform. This is a waste of everyone's time. (S04)

(*continued*)

Table 3. (*continued*)

Selective coding **(Number of nodes)**	Axis coding **(Number of nodes)**	Open coding **(Number of nodes)**	Representative viewpoints of interviewees
		Online course design (16 nodes)	But the effect of our online English class is not as good as that of offline…. According to the offline classroom model, everyone is supposed to speak on the podium. But online teaching skips this part. The teacher just asks everyone to upload the recording after class, which disappoints me. (S07)
		Social interaction (33 nodes)	It feels bad to study online. During the time of online learning, there is basically no interaction between the teacher and the student. Everyone can't see the face of each other because teachers and students are unwilling to turn on video cameras, which makes me lonely. Sometimes I even listen to the class while eating. (S11)

(*continued*)

Table 3. (*continued*)

Selective coding **(Number of nodes)**	Axis coding **(Number of nodes)**	Open coding **(Number of nodes)**	Representative viewpoints of interviewees
	Curriculum learning (18 nodes)	Course workload (11 nodes)	After turning to online teaching, there are more tasks after class. It feels like testing for the sake of testing, and PPT reports are required for each course. (S10)
		Assessment method (7 nodes)	~~If~~ Teachers don't use other methods to keep students' attention, such as randomly taking names and answering questions…. Calling and answering questions have become the main method of online course assessment. I don't like this method of assessment very much. I feel that I don't understand the teacher's question, and I must raise my hand to pretend to answer. It is too utilitarian in order to add points. (S02)

(*continued*)

Table 3. (*continued*)

Selective coding **(Number of nodes)**	Axis coding **(Number of nodes)**	Open coding **(Number of nodes)**	Representative viewpoints of interviewees
	Technology support (24 nodes)	Network status (14 nodes)	About the online learning experience, I think the internet speed is very important, because when I am at home, the internet speed is very fast. But after I arrive at school, it happens that the school's internet seems to have some problems, and then I am unable to connect the internet. Poor internet speed makes me can't keep up with the teacher's lecture progress and I miss a lot of important content. (S13)
		Platform function (10 nodes)	It will be great if students also can add their own notes on the screen explained by the teacher…. Allowing multiple people to edit the content of the course online. You can put a question mark on what you don't understand, and the teacher will know where the student didn't understand, and she will repeat it again, so that timely feedback is achieved. (S08)

(*continued*)

Table 3. (*continued*)

Selective coding **(Number of nodes)**	Axis coding **(Number of nodes)**	Open coding **(Number of nodes)**	Representative viewpoints of interviewees
Internal contributing factors of online learning experience (26 nodes)	Learner (26 nodes)	Intrinsic learning motivation (11 nodes)	In my opinion, online learning mainly depends on the intrinsic learning motivation of students, like my previous experience of attending online courses for postgraduate entrance examinations; my motivation is very strong at that time. (S05)
		Self-supervision ability (9 nodes)	Some students with good self-discipline will consciously study and complete the learning task even if they are not urged by a teacher, but students with poor self-discipline will fool themselves into not completing the learning task seriously. (S01)
		Autonomous learning ability (6 nodes)	Online learning is more suitable for students with strong autonomous learning ability. However, I belong to the passive learning type, and I barely learn actively on my own. (S09)

First, open coding is the process of decomposing data into independent units of meaning and its purposes are to conceptualize and label data (Glaser and Strauss 2017). Open coding begins the process of classifying many individual phenomena. The concepts of separate categories are grouped together around related topics to build more abstract categories. As shown in Table 3, a total of 11 initial categories are formed,

mainly including teacher teaching ability, teacher familiarity with technology, online course design, social interaction, intrinsic learning motivation, self-supervision ability, autonomous learning ability, course workload, assessment method, network status, and platform function.

Secondly, the axis coding is a process of inducing and summarizing the nature, dimensions, attributes, and other relationships between the initial concept categories formed, and organically linking various logical categories (Glaser and Strauss 2017). In the process of axis coding, we reviewed the internal logical relationship between the 11 initial categories, clarified the conceptual links between the categories, and finally integrated and refined 4 main categories: teacher, learner, curriculum learning, and technology support.

Finally, selective coding can be described as a process in which categories are related to core categories, which eventually become the basis of grounded theory (Glaser and Strauss 2017). We further classified the three main categories of "teacher", "curriculum learning" and "technical support" into the core category of "external factors", and classified "learners" into the core category of "individual internal factors". Finally, two core categories of "individual internal factors" and "external factors" are obtained.

5 Findings

This research follows the process of grounded theoretical analysis, synthesizing the relationship between the initial category, the main category, and the core category, and constructs a map of contributing factors of postgraduate students' online learning experience, as shown in Table 4. The results of the study show that individual internal factors and external factors such as the environment are the two main factors affecting the online learning experience of postgraduates. The online learning experience of graduate students is not only affected by external factors, but also by individual internal factors. Individual internal factors such as intrinsic learning motivation, self-supervision ability, and autonomous learning ability are the active conditions for graduate students to participate in online learning, and determine their participation status, and whether the participation status is active or not will directly affect the online learning experience of graduate students. External factors such as teachers, course learning, and technical support are the objective environmental elements for postgraduates to conduct online learning, and objective environmental elements are the basic conditions for postgraduates to produce online learning experience. The internal factors of the subject and external factors such as the environment are intertwined with each other, which together affect the online learning experience of postgraduates.

Table 4. Factors affecting postgraduate students' online learning experience

Dimensions	Factors
Internal factors on individuals (26 nodes)	Intrinsic learning motivation (11 nodes)
	Self-supervision ability (9 nodes)
	Autonomous learning ability (6 nodes)
External factors at teacher level (84 nodes)	Teaching ability (23 nodes)
	Familiarity with technology (12 nodes)
	Online course design (16 nodes)
	Social interaction (33 nodes)
External factors at the technical support level (24 nodes)	Network status (14 nodes)
	Platform function (10 nodes)
External factors at the curriculum learning level (18 nodes)	Course workload (11 nodes)
	Assessment method (7 nodes)

5.1 External Contributing Factors Such as Online Learning Environment

Through the sorting, coding and analysis of interview data, it is found that external factors such as the environment will have a certain impact on the online learning experience of postgraduates. External factors mainly include teachers, technology support, and course learning.

First of all, from the aspect of teacher, their teaching ability, teachers' familiarity with technology, online course design, and social interaction has the greatest impact on the online learning experience of graduate students. The Table 3 shows that the number of nodes at the teacher level is the largest, about 84 nodes. The four elements at this level are directly related to the quality of the postgraduate online learning experience. The stronger the teacher's teaching ability and familiarity with technology, the more novel the curriculum design, and the more flexible the social interaction, the better the online learning experience for graduate students. Among them, the online learning experience of graduate students is most affected by social interaction (the number of nodes is 33). Social interaction refers to the social communication and online cooperation between learners and teachers, learners and learners, learners and other experts, etc. From the actual online learning experience of graduate students, the interactivity of online learning is far from meeting their needs. There is very little interaction between teachers and students or students and students, and their interactions are often not instant enough, which brings a bad online learning experience to learners. For example, a graduate student mention that "the teaching interaction of online courses is too little, the group is very deserted, and there is no interaction with each other" (S11); another student mention that "online learning has no learning atmosphere and cannot see the learning status of peers, and there is basically no communication between classmates, so sometimes I feel very lonely" (S06); another example is that the interviewee pointed out that "the teacher's online lectures should be more interactive, mobilize the enthusiasm of the students, and encourage everyone to discuss. If this can be solved, I think the online learning experience

will become better" (S05). The above shows that the current degree of interaction in online learning is not ideal, and weak interaction cannot meet the relationship needs of graduate students, and it is not conducive to mobilizing the enthusiasm of graduate students, leading to a negative online learning experience.

Secondly, the network conditions and platform functions at the technical support level are another key factor that affects the online learning experience of graduate students. Good network conditions and platform capabilities can make learners have a positive online learning experience. On the contrary, it will bring a poor experience. Some interviewees express their views on Internet speed:

Internet speed is very important because when I am at home, the internet speed is very fast. But after I arrive at school, it happens that the school's internet seems to have some problems, and then I can't connect the internet, which make me can't keep up with the teacher's lecture progress and miss a lot of important content. (S13)

In addition, during the interview, the interviewees state that the ease of use and convenience of the platform's functions will also have a certain impact on their learning experience. "Because the platform has many forms and functions, it is also very complicated, which makes it difficult for everyone to grasp." (S01), therefore, technical support and services are also important factors that cannot be ignored.

Finally, it is worth noting that the assessment methods and the course workload at the learning level of the course will also affect the online learning experience of postgraduates. When teachers carry out online teaching activities, the design of assessment methods and the arrangement of curriculum tasks should be reasonable and effective. They should not only achieve the effect of testing learners' learning conditions, but also the testing should not be conducted too frequent. In the interview, some students raise doubts about the assessment method and the amount of course tasks. "After becoming online teaching, there are more assessment items and assignments. The teacher assigns a lot of homework and every course needs a PPT report. "(S10).

5.2 Internal Contributing Factors of Individuals

This study finds that not all postgraduates' online learning experience is affected by external factors, but also by individual internal factors. Individual internal factors mainly include learners' internal learning motivation, self-supervision ability, and autonomous learning ability.

Intrinsic learning motivation refers to the motivational tendency to stimulate and maintain learners' learning behaviors and make them move toward a certain academic goal. It will affect learners' interest in learning activities and willingness to participate. In the interview, some interviewees state that "I think online learning mainly depends on the intrinsic learning motivation of students. Like my previous experience of attending online courses for postgraduate entrance examinations, my motivation is very strong at that time" (S05). It can be seen that the strength of intrinsic learning motivation will affect the state and enthusiasm of learners to participate in online course learning, which in turn leads to differences in learners' sense of online learning experience. During the interview, we find that graduate students with strong internal learning motivations have relatively better online learning experience. One graduate student states that "online learning is not much different from offline learning, but online learning can avoid the

interference in the offline environment and concentrate on learning" (S03). In addition, self-supervision ability is also one of the internal factors that affect the online learning experience of postgraduates. It refers to the learner's constraints on their own behavior, thoughts, and speech, that is, the process of achieving expected goals through the regulation and restriction of the subject and the object. Since the organization of online learning is decentralized and lacks strong supervision by teachers, learners often need to have stronger self-supervision capabilities, while learners with poor self-consciousness will have a poor online learning experience. Some graduate students speak frankly that "online learning is not suitable for me, because without the supervision of teachers and classmates, my state of online learning is very lazy, and I often hang up and play games" (S11). Another intrinsic factor that is as important as self-supervision ability is self-learning ability. 6 graduate students out of 13 interviewees believe that self-learning ability is a necessary condition for completing online courses. "Graduate-level courses often expect students to study on their own. The online learning environment is free, and I will be more actively involved in learning and improve my ability" (S07).

6 Discussion and Conclusions

The main conclusions of this research are as follows. The first conclusion is that the online learning experience of graduate students is affected by the internal factors of the subject and external factors such as the environment. Among them, the internal factors involve the level of learners, and the external factors such as online learning environment cover the level of teachers, course learning as well as technical support. The second conclusion is that there are 11 key factors that will affect the postgraduate online learning experience, mainly including teacher teaching ability, teacher technical literacy, online course design, social interaction, network conditions, platform functions, assessment methods, course tasks, intrinsic learning motivation, self-supervision ability, and autonomous learning ability. The third conclusion is that the factor of social interaction plays a key role in the online learning experience of graduate students.

Based on the above research conclusions, this research proposes the following improvement suggestions to optimize the online learning experience of graduate students.

6.1 Strengthen Teachers' Training to Improve Their Online Teaching Ability

The online teaching ability of teachers is closely related to the online learning experience of learners. Also, considering the fact that teachers are the main implementers and instructors of school teaching activities, colleges and universities should provide teachers with more skills training and further training opportunities to continuously improve their online teaching capabilities. Because of the sudden outbreak of the COVID-19, the online teaching pattern becomes an emergency measure during the epidemic prevention period. Some college teachers do not have the necessary teaching skills to carry out online teaching activities. It is also found from the interviews that most interviewees express concern about teachers' online teaching ability, they believe that some teachers have copied offline courses to the internet, and still habitually uphold the traditional

teaching concept of "teacher-centered". All in all, teachers should actively participate in online skills training inside and outside the school, actively improving their own teaching ability. Only doing this can ensure the quality of online teaching, and then enhance the learner's online learning experience.

6.2 Enhance the Interactivity of Online Learning

In view of the fact that social interaction plays a key role in the online learning experience of graduate students, teachers should pay attention to the interactive communication with learners to avoid one-way knowledge instillation that causes negative learning experience for learners. Teachers need to adopt more interactive teaching methods when designing teaching, such as cooperative learning method, inquiry discovery method, task-driven method, etc., encouraging learners to make full use of the platform's collaborative tools to carry out cooperative learning, guiding students to conduct more simultaneous interactions. In addition, teachers should also hold regular online Q&A activities to dynamically grasp learners' online learning status, in order to timely provide learners with diagnostic feedback to strengthen the interactivity of online learning.

6.3 Carry Out Online Learning Guidance to Cultivate Students' Independent Learning Ability

Online learning requires learners to have stronger self-learning ability, but most learners have not yet developed the ability to learn independently, and still rely on the supervision and guidance of teachers habitually; they are even unable to completely abandon the traditional classroom learning thinking. It is necessary for universities to actively offer online learning guidance courses to cultivate learners' independent learning ability and self-supervision ability. That can guide learners to conduct scientific and effective online learning, which will help to form a positive online learning experience.

6.4 Improve Platform Construction and Optimize Online Learning Technical Support Services

The diverse forms of current online learning platforms, complex rules, and insufficient personalization of functions are objective environmental factors that affect postgraduates' online learning experience. Therefore, government departments, companies, enterprises, and universities should work with together to continuously improve the functions of online learning platforms, paying attention to the real needs of learners and teachers. For example, students' needs include strengthening the interactive functions of the platform, simplifying the operation process of the platform, supporting the diversified presentation of teaching resources, realizing the simultaneous editing of course content by multiple people, as well as the development of fun quizzes in class. Only by doing so can provide learners with a more convenient and humanized online learning experience.

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Appendix

Interview questions

1. What do you think is the difference between the online learning environment and the offline course environment?
2. Can the online learning environment meet your learning needs?
3. Can you talk about your feelings about participating in online course learning activities?
4. What kind of experience did you get through online courses?
5. What aspects do you think will affect your online course learning experience?

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A Case-Study on Revamping Course Structure and Assessments of Practical Course to Online Learning During an Ongoing Global Pandemic in a Taiwan University

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Abstract. The ongoing global pandemic of coronavirus disease has an enormous impact in Taiwan, especially in the field of education. Teachers and students are forced to change their teaching and studying mechanisms—from traditional in-class face-to-face to online learning. This paper aims to explore the learning experiences of online and face-to-face learning based on students' perspectives. It demonstrates the differences between face-to-face and online learning through revamping the course structure and assessments of the Exhibition Management and Planning course at a University in Taiwan. Researchers conducted a qualitative survey and face-to-face interview with 32 students who learnt and organized an online exhibition as their final assessment of the course at the end of the semester. Based on the research findings, recommendations are made for applying technical knowledge and skills in education. Both teachers and students must learn new knowledge and skills, as online studying has become one of the essential elements in the education sector. For example, Virtual Reality (VR)/Augmented Reality (AR)/Mixed Reality (MR) technologies were applied in the exhibition classes last semester. Teachers and students have to learn this new knowledge and skills to meet the exhibition industry's expectations and needs in Taiwan.

Keywords: Online learning · Online assessment · Online exhibition · Practicum course · Coronavirus pandemic · Exhibition management

1 Introduction

Pandemics have the potential to reshape the world radically, and it has long-term impacts on the future of education. All stakeholders have to learn new technologies to provide and receive new knowledge. It is evident that we cannot return to the world as before. Technology is one of the vital factors in the education sector after a pandemic. The high education institutions in Taiwan were suddenly forced to convert their traditional

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in-class education to online teaching and learning by the Government during the COVID-19 coronavirus pandemic in Taiwan during 2019 and 2020 (Wu et al. 2021). While the spread of the COVID-19 epidemic seems under control, another new virus, the Omicron, has been discovered—a seemingly incessant phenomenon (The Storm Media 2022). Therefore, studying and applying new technology in the education sector has become critical to teachers and students.

However, employing new technology for practicum-based courses may either motivate or stress out teachers and students. For example, in some practicum-based courses which need to train students for practical experiences, such as the exhibition management course, teachers demonstrate the definition of "exhibition" and some other concepts (e.g., the pre-stage of exhibition management, the during- and post-stage of the exhibition, risk management, and others) by conducting a general teaching approach such as lecturing and workshops. As an outcome assessment, students are required to organize a real exhibition event by the end of the semester. Before the coronavirus pandemic, this type of teaching and learning is generally called "learning by doing". However, after the pandemic outbreak since May 2021 (Chen 2021), both teachers and students were compelled to use online teaching and learning methods, given that the lecture and workshop approach is easy to conduct through online platforms, for instance, TEAMS. Chung Hua University (CHU) is one of the universities in Taiwan that apply TEAMS as their online teaching platform across their Schools and Departments (Wu et al. 2022). From students' perspectives, organizing an online exhibition event seems like learning extra knowledge and skills. Remarkably, after the pandemic, online exhibition events have become a critical developing trend in the exhibition industry, compelling students to adapt and learn. This study aims to explore the learning experiences of online learning versus face-to-face studying in the Exhibition Management and Planning Course based on students' perspectives.

2 Literature Reviews

The global pandemic has had an enormous impact. Some industries have changed some activities to prevent interactions among people, affecting teaching and studying the education sector. MICE is abbreviated from Meeting, Incentive Travel, Convention and Exhibition. It is also called business events due to its business content. It is a relatively new stream in universities. Courses are generally taught through practicum-based learning. For example, exhibition management is one of the essential subjects in the MICE department at CHU. In order to integrate theory with practice in this subject, the researcher not only teaches theory in lecture style, but also requires an actual exhibition performance organized by students. Learning by doing is a crucial concept in teaching this stream. This study will discuss how the MICE department converts the course structure and assessments of the Exhibition Management and Planning to comply with the exhibition industry's expectations and requirements and relevant education.

2.1 The Exhibition Industry

Exhibitions, one of the many business events, have been used as one of the essential sales and communication tools worldwide for many centuries. Due to its characteristics,

business tourists travel from one city to another to meet people for specific purposes. With the high demands for transportation and accommodation, the exhibition industry is also considered one of the tourism industries. The exhibition industry comprises companies that operate by showcasing and allowing spaces and conducting events meant for various purposes of commercial and artistic nature. While exhibition refers to permanent displays, exhibitions are typically considered temporary in common usage. They are usually scheduled to open and close on specific dates at specific times in a particular period (Market Research Reports, Inc. 2021). Before 2019, the exhibitions industry has been successfully developed well worldwide (Mussina et al. 2019; UFI 2014; Kirchgeorg and Jung 2010). Prior to 2019, the exhibition industry has successfully developed well across the world. As of 2019, there were approximately 32,000 exhibitions each year featuring companies from automotive producers to defence, attracting over 303 million visitors. Due to the lucrative nature of the industries participating in the global exhibition industry, exhibitors and visitors combined spend billions every year in the process, making exhibitions a significant global industry—one valued globally at $29 billion and linked directly and indirectly to roughly 3.2 million total jobs worldwide (Consultancy.uk 2021).

However, COVID-19 has seriously affected the exhibition industry since 2019. With many of the world's largest corporate exhibitions being canceled in 2020 due to the coronavirus pandemic, the global exhibition industry was predicted to see 69–70% of its value wiped out by the end of 2020, making it one of the worst affected sectors (Consultancy.uk 2021). The outbreak of the COVID-19 coronavirus pandemic is seriously hampering market growth (Reportlinker.com 2020).

2.2 Technology Development

Although COVID-19 brought enormous impacts to the exhibition industry, some reports have optimistic perspectives. Globex Editor Carole Boletti (Consultancy.uk 2021) indicated that while the COVID-19 crisis has severely disrupted the exhibition industry, it has benefited from markets and accelerated digital developments, according to organizers' perspectives. Forward-looking organizers are investing in the enhanced role of digital technologies in their strategies and are embarking on substantial digital transformation. A survey conducted by the Professional Convention Management Association (PCMA) showed that the coronavirus pandemic and the transition to digital events had created new requirements for events professionals. Since online events will become a significant part of the exhibition industry for the foreseeable future, 84% of event planners said they planned on learning more about digital events. Technology will play an increasingly central role in all circumstances and event planning (AddVideos.com 2020; Zero 1 Exhibitions 2021).

The high technology development trend in the industry affects the education sector. For example, AR (Augmented Reality), VR (Virtual Reality), MR (Mixed Reality) have been applied in the education environment currently. VR is the term used to describe a three-dimensional, computer-generated environment that can be explored and interacted with (Barnard 2021). AR integrates digital information with the user's environment in real-time (TechTarget Contributor 2022). Kiger (2020) explained that MR is a step beyond Augmented Reality, in which additional information is added to what a user

perceives. In MR, the physical and virtual worlds interact, and users can interact with them as well. As computer chip manufacturer Intel's website explains, MR "provides the ability to have one foot (or hand) in the real world, and the other in an imaginary place." While AR enhances a user's perception of the real world, MR can blur the difference between real and not. Thompson (2020) demonstrated that using VR/AR/MR in education is that students will learn through experiences. Thompson (2020) indicated that VR transforms lectures into immersive learning experiences, enabling lecturers to truly bring their subjects to life. Li et al. (2021) further commented that Artificial Intelligence (AI) has been developing rapidly in universities to enhance teaching and learning in academia. AI is becoming a new phenomenon in industries and universities. Students may need to enrich their new technology knowledge to better competitive advantages for their future careers. While students need to learn up-to-date technical skills, teachers must also embed new technologies into their pedagogy and curriculum.

2.3 Teaching Methods

Generally speaking, practicum-based courses are applied to the exhibition and event management related education for the MICE industry. A practicum course is a 'hands-on' class, which allows students to apply the theories they learned in practical situations. For example, practicum courses in events-related courses may include organizing or participating in an event. The practical aspects of something involve real situations and events, rather than just learning theories. John Dewey is the pioneer of the "learning by doing" approach. He believes that people learn best through a hands-on approach (Dewey and Hinchey 2018). Before the coronavirus pandemic, the "learning by doing" approach was easily applied through the traditional face-to-face teaching method. Teachers and students can meet and interact in the classroom, and teachers use teaching materials to teach students.

Furthermore, the "learning by doing" approach has been applied effectively. For instance, the researcher asked students to organize an exhibition event at the end of the semester as a performance in the exhibition management course. Teachers demonstrate theories and concepts. Meanwhile, students give reactions, submit assignments during the semester, and conduct an exhibition event as the final assessment by the end of the semester. Feedback from previous students has indicated that they have learned a lot from practically organizing an event in the class, and they could also learn step by step from their experiences. Furthermore, this learning experience has increased their learning motivations.

However, since May 2020, the COVID-19 outbreak in Taiwan compelled teachers and students to apply online teaching and learning methods. Noteworthily, interactions between teachers and students via online tools, such as TEAMS, seem to work (Wu et al. 2022). However, organizing an actual exhibition event as a final assessment appears to be a problem. At the end of the academic year 2019, several final scheduled performances at the College of Tourism of CHU were cancelled due to the outbreak of COVID-19. Consequently, students were instead required to perform other arrangements as their final assessment, such as online presentations. Students have mentioned that they were disappointed, as they have prepared for a long time. They also suggested that they conduct the performance virtually or hybrid for the next semester by learning technical skills.

2.4 Technology Embedded into Teaching

Technology is one of the new skills integrated into the knowledge of non-technology students. For instance, teachers have generally prepared professional technical knowledge for teaching tourism-related subjects, such as tourism, events management, exhibition management, and others. On the other hand, students have also obtained knowledge from textbooks and teachers. However, social distancing has been applied since the global spread of the coronavirus pandemic in 2020 to prevent close contact with others. Teachers and students were prohibited from going to classrooms and were required to apply online teaching and learning instead of the face-to-face approach, making technology skills and knowledge necessary. However, determining whether learning new technologies is an opportunity or stressful for teachers and students alike remains challenging.

The researcher has taught exhibition management subjects at the Tourism and the MICE Management Department for many years. Before the coronavirus pandemic, six courses were arranged in eighteen teaching weeks, and the Exhibition Management course would be delivered through lectures, discussions, and workshops. The class schedule and arrangements for the course are shown in Table 1.

Table 1. Syllabus for exhibition management class *Before* the COVD-19 pandemic

Weeks	Subject	Teaching method	Assessment
1–3	Concept of Exhibition Management	- Lecture - Workshop	- Presentation - Decide the subject for a final performance
4–6	Concept of Exhibition Planning	- Lecture - Workshop	- Presentation - Decide the subject for a final performance
7–10	Booths design	- Lecture - Workshop	- Hands-on experience in designing booths - Group discussions
11–14	Exhibition planning	- Lecture - Workshop	- Group discussions - Hands-on experience in planning a real exhibition
15	Real exhibition performance	- Perform real exhibition	- Perform real exhibition
16–18	Final Review	- Lecture - Workshop	- Group Discussions - Students' feedback reviews

After the coronavirus pandemic, the researcher added technology elements into the class. The class schedule and arrangements of the course are shown in Table 2.

Table 2. Syllabus for exhibition management class *After* the COVID-19 pandemic

Weeks	Subject	Teaching method	Assessment
1–3	Concept of Exhibition Management	- Lecture - Workshop	- Presentation - Decide the subject for a final performance
4–6	Concept of Exhibition Planning	- Lecture - Workshop	- Presentation - Decide the subject for a final performance
7–9	Technology application (students learn VR/AR/MR)	- Lecture - Workshop	- Hands-on experience in applying technology - Group discussions
10–12	Booths design – with VR/AR/MR application	- Lecture - Workshop	- Hands-on experience in designing booths - Group discussions
13–15	Exhibition planning	- Lecture - Workshop	- Group discussions - Hands-on experience in planning a real exhibition
16	Real exhibition performance (online)	- Perform real exhibition	- Perform real exhibition
17–18	Final Review	- Lecture - Workshop	- Group Discussions - Students' feedback reviews

A technology company in Taiwan has collaborated with the College of Tourism of CHU. It contributed a laboratory that included new equipment, including AR, MR, and VR, which can be used to design new materials for the class. Compared to the previous syllabus, technology applications such as VR, AR, and MR have been added to the course. Professional experts from technology companies have been invited to give VR, AR, MR related theories in the 7^{th}–9^{th} week. In the 10^{th}–12^{th} week, students are required to apply theories to practice in the class. Meanwhile, this means that teachers and students must learn new knowledge and skills, which may not interest them. This study aims to explore the learning experiences of online learning versus face-to-face studying on the Exhibition Management and Planning Course based on students' perspectives.

3 Research Methodology and Design

This paper aims to explore the learning experiences of online and face-to-face learning based on students' perspectives. This study conducted a qualitative survey and face-to-face interviews with students in the Exhibition Management class.

As demonstrated previously, this practicum course is a 'hands-on' class, which allows students to apply the theories they learned in practical situations. However, due to the outbreak of the COVID-19 effect, the course will be delivered and studied on an online basis. For students who are also the first time to study this subject. In order to obtain their

perspectives on the learning outcome, it is suggested to conduct a face-to-face survey to understand their perspectives. In 2021, we conducted face-to-face with all students who studied this class, and there was a total of 32 students attended the class. Researchers conducted a focus group interview with 7 groups (32 students were grouped into 7 groups by different subjects) at the end of the semester.

The survey aims to discover the students' concerns regarding online and face-to-face learning in the captioned course.

The survey questions for the discussion include:

A. *What is the difference between organizing virtual and actual exhibitions after the performance? Which one do you prefer?*
B. *Any other suggestions or comments for the class?*
C. *What should students and teachers learn/teach for online learning?*
D. *Which do you prefer between online and face-to-face learning? Why?*

4 Findings and Discussions

Thirty-two third-year students from the Tourism and MICE Management departments at the College of Tourism at Chung Hua University participated in the qualitative survey. They all attended the exhibition planning and management course this semester, and the final assessment of the class was to organize an online exhibition at the end of the semester. Table 2 presents the comparison between the class arrangements for this semester and the previous semester, where technology, for example, VR, AR and MR, have been incorporated into the class. Experts from Technology Company have been invited to the class to give speeches, and students have also attended the VR, AR, and MR workshops. Thirty-two students were grouped into seven groups at the beginning of the semester, and each group proposed their subjects for the exhibition. After the presentation from each group, students voted the best topic. This group was the coordinator group responsible for organizing the exhibition for the semester. Once the best exhibition subject has been voted, other groups would become the exhibitor groups and follow the voted subject to plan the exhibition. The exhibition subject for this semester was 'ants on the plate–online baking exhibition'.

4.1 Responses from Students

A. *What is the difference between organizing virtual and actual exhibitions after the performance? Which one do you prefer?*

Students were required to organize an online exhibition as their final assessment for their Exhibition Management and Planning class in December 2021. After the online exhibition performance, students were asked to give their feedback on organizing the event.

Online exhibitions give room for those who cannot attend the actual exhibition. Only 6 out of 32 respondents preferred online exhibitions, given the fees and flexibility.

However, the fees for venue rentals and the decorations for the booth are not a genuine concern.

On the other hand, 24 respondents preferred to organize actual exhibitions. They indicated that reaction is the critical element. A hybrid event uses a combination of in-person and digital factors tailored to each audience for optimal experiences. Most research revealed that exhibition is a human-interactive industry (Expo Display Service 2021; Bowdin et al. 2011; CEIR 2003). It has been used as one of the most effective and popular marketing tools by business organizations (Ivkov et al. 2015; Han and Verma 2014; Bowdin et al. 2011; CEIR: Centre for Exhibition Industry Research 2003) due to its influential marketing function. It was their first time organizing an online exhibition, and they said that the exhibition was bland and uninteresting. Students further mentioned that they just sat in front of the computer, played their pre-shooting video, and demonstrated their products. They can only interact with attendees onsite. However, they could not meet attendees face to face immediately if attendees had further questions.

Two respondents mentioned that they liked to organize the exhibition in a hybrid manner. A hybrid event uses a combination of in-person and digital elements tailored to each audience for optimal experiences (Freeman 2021). Hybrid events are likely to be one of the biggest trends in 2021. Hybrid events add a virtual element to a traditional live event structure. They allow shows and pave the way for small groups to participate in face-to-face sessions, which are then shared with larger audiences through live streaming or other digital platforms (Zero 1 Exhibitions 2021).

As previously mentioned, most students preferred organizing actual over virtual exhibitions, given that they could interact with the attendees. Some students said that while virtual exhibitions only allow them to interact with attendees through chats, it also focuses more on web page design. Meanwhile, presenting booth designs online is difficult for non-computer-related majors. In order to present the exhibition to attendees on one screen, all elements need to be shown on the screen. VR, AR, MR elements have been applied to the class. Booth design is also one of the critical elements of the exhibition. Booth rental is generally a big part of the budget for attending the exhibition for both organizers and exhibitors. Most exhibitors decorate their booths by providing as much information and promotion activities as possible to attract attendees. Attendees can talk, touch, and experience with exhibitors onsite. For example, exhibitors may provide giveaway gifts and arrange interesting booth activities. An image of previous actual exhibitions performance is shown in Table 3. Employing promotion activities online may reduce the interaction with attendees, resulting in attendance intention from exhibitors and attendees. Table 3 also shows the differences between previous semesters' Online and actual exhibitions.

B. *Any other suggestions or comments for the class?*

It was the first time that students performed an online exhibition. They have made the following suggestions:

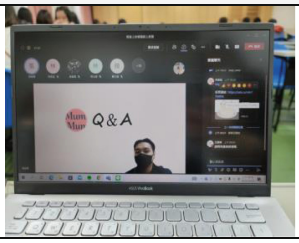
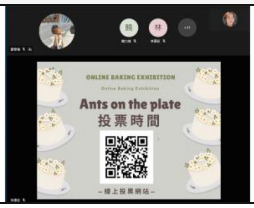
– *Hardware improvement.* Students emphasized that the internet is significant in online exhibitions. During the exhibition, network delays occurred several times. In addition,

Table 3. The differences between online and real exhibitions from previous semesters

2021 Online exhibition – organizer group	Previous actual exhibition – organizer group
	
Exhibition performance day: - Online exhibition: organizer group used computers as the main tool - Real exhibition: organizer group had to have booth design onsite	
2021 Online exhibition – key vision	Previous actual exhibition – key vision
	
Key Vision: - Online exhibition: Key vision has been placed online - Real exhibition: Key vision has been printed and placed onsite	
2021 Online exhibition – venue/booth	Previous actual exhibition – venue/booth
	
Venue/exhibitors: - Online exhibition: all exhibitor groups were in one place, and they used computers as the main tool - Real exhibition: all exhibitor groups have to design their booths onsite at the actual exhibition venue	

(*continued*)

Table 3. (*continued*)

2021 Online exhibition – interaction	Previous actual exhibition – interaction
	
Interaction: - Online exhibition: interactions between organizers and attendees were online only - Actual exhibition: interactions between exhibitors and attendees were in person at the real exhibition booth	
2021 Online exhibition – interaction	Previous actual exhibition – interaction
	
Interaction: - Online exhibition: interactions and activities between organizers and attendees were online only - Actual exhibition: interactions and activities between exhibitors and attendees were in person at the real exhibition booth	

Sources from the authors

students have to bring their own computers, some of which even have less performance. It is suggested that the university provide high-performance computers and high technology facilities such as VR/AR/ MR room for the event.

– *More practice makes perfect.* Students also need to practice more and perform rehearsals before the performance, as some were unfamiliar with computer functions. For example, last semester, the TEAMS application was applied as the online exhibition platform. TEAMS is also the main online teaching and studying tool at the CHU. However, some students seem only use it negatively. They have only used it as an online studying tool instead of going to the class in person.
– *Professional assistance.* Some professional experts from the industry were invited to give speeches related to VR/AR/MR last semester. Students also suggested asking some experts to demonstrate online exhibitions in the industry.

C. *What should students and teachers learn/teach for online learning?*

All students agreed that online learning had developed after the coronavirus pandemic. Learning new technical knowledge and skills is essential, whether students like it or not. It is a must if they want to gain better career strengths in the future. Students also agreed that teachers must likewise learn new technical knowledge and skills to assist students with questions about technology. In this research, teachers and students are expected to learn TEAMS applications. TEAMS is the primary online learning tool at CHU. In addition, the teacher is supposed to learn VR/AR/MR technical knowledge to teach students in the exhibition management class.

D. *Which do you prefer between online and face-to-face learning? Why?*

Sixteen respondents preferred online classes. Compared to the previous semester, teachers and students were now forced to apply online teaching and learning methods on short notice. They were unfamiliar with the online platform, and most students like to study in the classroom. However, after having more practice in a few months, teachers and students adapted to the online platform. Students nowadays have gradually accepted online learning. They said they might have more time to study if they study online. One of them also mentioned that online learning is not a choice amidst the coronavirus pandemic; compared to in-classroom learning, he could not learn anything online.

Further, fourteen respondents preferred to study in the class as they can react with teachers and students and ask teachers questions if they have any. On the other hand, two respondents replied that it does not matter whether online or face-to-face learning is employed as it depends on the subject. They preferred to learn theory lessons online and learn practice classes in the classroom. Thus, hybrid learning may increase their learning motivations.

5 Recommendations

This paper aims to explore the learning experiences of online learning versus face-to-face studying in the Exhibition Management and Planning Course based on students' perspectives. It demonstrates the differences between face-to-face and online learning through the final assessments of the Exhibition Management and Planning course at CHU by conducting a qualitative survey of 32 students who organized an online exhibition as their final performance at the end of the semester. Based on the research findings, some recommendations are made for applying technical knowledge and skills in education, i.e. both teachers and students must learn new knowledge and skills, as online studying has become one of the essential elements in the education sector. For example, last semester, VR/AR/MR technology was applied in the exhibition class. Teachers and students must learn this new knowledge and skills to meet the industry trend. Ng et al. (2021) proposed that a well-planned schedule, appropriate instructional design, adaptive learning and teaching resources, and prior blended-learning experience might facilitate good online learning and teaching experience for students and teachers.

5.1 Learn New Knowledge and Skills for Both Teachers and Students

The global COVID-19 outbreak has had an enormous impact on individuals. In the education sector, teachers and students were required to use online teaching and learning methods to adhere to the social distancing policy, which poses a challenge in teaching, like the interaction between teachers and students. Different teaching approaches, such as lectures, workshops, and learning by doing, have been applied, and students attended and participated in the class activities. As the coronavirus pandemic occurred, technology has become another necessary knowledge and skill for humans. In order to keep up with the development trend, it is suggested that teachers and students embed new technical knowledge and skills into their teaching and learning strategies. VR/AR/MR are the latest knowledge and skills teachers and students have to learn in this study.

5.2 Online Studying Development Trends

Although the coronavirus pandemic may end in the future, online teaching and learning will continue as a new development trend. In the case of the Exhibition Management and Planning course, students preferred to study online, which has become the development trend. For the sake of full-time students, in terms of facilitating and nurturing the new normal of online learning in universities, teachers are required to offer more patience, guidance, and care in the new era of online learning nowadays (Ng et al. 2021). This development may allow the education sector to collaborate with other overseas universities by providing online courses to overseas students even after the coronavirus pandemic.

6 Limitations and Further Research

Currently, online learning seems to be one of the study trends for students. The coronavirus pandemic has brought several negative impacts on individuals. However, it is also an opportunity to speed up humans' technological application. This study explores online and face-to-face learning outcomes based on students' perspectives. It mainly conducted a qualitative survey of thirty-two students participating in CHU's Exhibition Management and Planning course. The researcher applied several teaching methods in this course, such as lectures, workshops, and learning through online and face-to-face methods. Students were required to have a group discussion and presentation face-to-face and online during the term and organize an online exhibition at the end of the semester as their final assessment. The limitation of the study includes the comparably small limited samples, falling short in evaluating other courses or departments. However, it provides more in-depth information on students' experiences of face-to-face and online learning.

To further explore the factors for enhancing learning effectiveness, it is suggested that a survey or an interview be conducted for other courses, departments, or universities.

7 Conclusion

Online learning has become one of the learning trends, given its convenient access to teachers and students. This paper provides the learning outcomes of the online or

face-to-face learning approach from students' perspectives. Although its lack of actual interaction, the survey results showed that students gradually accepted online learning compared to before the coronavirus pandemic. Therefore, it is suggested that teachers learn new technologies to improve their teaching efficiency. Moreover, it provides an opportunity to the education sector for further international collaborations.

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How Vietnamese Foreign Language Teachers Survive and Thrive: Tracing Successful Online Teaching During the COVID-19 Pandemic

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Abstract. The global COVID-19 pandemic has highlighted the urgent need for teachers to be trained in technological skills and develop effective online pedagogical strategies. While recent scholarly attention has been paid to the context of digital transformations in developed countries, there is a dearth of rigorous research literature exploring how to empower foreign language (FL) teachers in Vietnam to adapt to online education in the 'new normal.' This study provides an understanding of the pedagogical adaptation and transformation during the pandemic and explores the underlying factors contributing to their successful online teaching. The critical incident technique (CIT) and semi-structured interview were employed to collect data. The impetus of this study is an evidence-based model for teacher training that can be utilised as a guide for empowering effective online teaching. The study findings have wider implications for FL teacher education and training programs and equally applicable to other similar social-cultural contexts.

Keywords: Online teaching · FL teachers · Pedagogical digital competence · Pedagogical transformation · Education equity · Professional development

1 Introduction

Promoting inclusive and equitable quality education for all is one of the United Nations' 17 Sustainable Development Goals that could potentially transform the world by 2030 (United Nations 2015). However, the global COVID-19 pandemic has challenged the social divide in developing and developed countries. Teachers and students in disadvantaged areas become vulnerable and exposed to this divide, triggering education inequity (Bozkurt et al. 2020). Many educators call for equity in primary and secondary schools, particularly in remote regions where students and teachers feel difficult to access digital devices needed for online teaching and learning. Since 2020, schools and universities have shifted to online teaching mode (Pollack et al. 2020; Bozhert *et al.* 2020; Moorhouse et al. 2021) in response to the first outbreak of COVID-19, and Vietnam is not an exception. Dharmaraj (2020) noted that during the COVID-19 restrictions applied at all levels, from K-12 schools to tertiary institutions nationwide, Vietnam experienced an

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increase in the number of learners accessing online learning platforms. The pandemic has forced many teachers to switch to online teaching mode. Before the pandemic, online learning played a peripheral role in the formal higher education systems in Vietnam and has become more prominent after the pandemic (Pham and Ho 2020). A stipulation of "suspending school, not stopping learning" was made by the Ministry of Education and Training (MOET) (Pham and Ho 2020, p. 1328).

Teachers play a pivotal role in determining students' adoption of technological devices in both formal and informal learning environments (García et al. 2019; Vo and Mu 2020). The pandemic has highlighted the urgent need for teachers to be trained in technological skills and develop effective online pedagogical strategies (Bozkurt et al. 2020; Rehn et al. 2018). While recent scholarly attention has been paid to the context of digital transformations in developed countries, there is a dearth of rigorous research literature exploring how to empower foreign language (FL) teachers in Vietnam to adapt to online education. Most of the literature focuses on teacher educators (e.g., Maheshwari 2021; Vo 2020; Pham and Ho 2020; Tran 2016). Many Vietnamese university lecturers showed their attitudes towards online teaching shifted from hesitancy and complaints to satisfaction and enjoyment of this educational mode, with 75% of surveyed university lecturers expressing their interest in continuing teaching online (Tran 2020). However, relatively little empirical evidence has been given to understand the actual teaching experiences of school teachers during the pandemic. As previous studies confirm that teachers' teaching experience is one of the most fruitful sources of learning a foreign language (Vesna and Ivana 2020), emphasis should be placed on identifying Vietnamese FL teachers' current teaching practices and challenges in striving for equity and excellence in their online teaching. This study aims to provide an in-depth picture of the complicated online teaching process and offer insights into FL teachers' experiences. More specifically, the current research explores the underlying factors contributing to their successful online teaching. Coding and understanding challenges enhance understanding of the pedagogical adaptation and transformation during the pandemic. The impetus of this study is an evidence-based model for teacher training that can be utilised as a guide for empowering teachers' online teaching.

2 Literature Review

2.1 Online Education: An International and National Irresistible Trend in the 'New Normal'

Significant changes in the global context have resulted in the ubiquitous use of digital technologies for various purposes. The advancement of information and communication technology (ICT) in all aspects of life and the increasing need for flexible learning environments have brought online education popularity over the last decade (Seaman et al. 2018). It is vital for employees to engage in lifelong learning and acquire new competencies to adapt to the constantly changing working environment. In an unprecedented time with the COVID-19 outbreak, online teaching brings teachers and educators worldwide flexibility without geographical and time zone constraints. Learning with mobile technology requires student creativity, one of society's 21st-century skills (Van de Oudeweetering and Voogt 2018).

In the context of Vietnam, the topic of digital transformation still seems to be in its infancy. The government supports the training of human resources in accordance with the trend of technological revolution 4.0 (Huynh and Le 2017) and advocates for the integration of new technologies into the national higher education to catch up with the global market (Pham and Ho 2020). The Vietnamese government declares its aim no one left behind in the pandemic (Pham and Ho 2020). An official document No.1061/BGDĐT-GDTrH was issued by MOET in 2020, guiding online teaching. Education is one of eight priority areas for digital transformation in Vietnam in 2025–2030, aiming to achieve 100% of educational institutions implementing online teaching (Vietnamnet 2020).

During the long closure strictly applied at all levels from K-12 schools to tertiary institutions nationwide in early 2020, Vietnam witnessed the paradigm shift from face-to-face learning to online learning in response to adverse changes in all sectors of society. The recent statistics show 80% of Vietnamese learners can access technological devices for online learning (BBC News 2021). Smartphones and laptops were students' most frequently used technology devices for online learning, with 80.36% and 77.65%, respectively (Dinh and Nguyen 2020). Mobile devices offer students flexibility when learning languages, enabling them to easily access information and help them adapt to their learning habits (Vo 2020). Using smartphones and other mobile technologies in language learning has benefitted teachers and students. Learners have widely recognised the benefits of electronic devices for language learning, but their usage is hindered without guidance and support (Tran 2016).

Schools are challenged to ensure that students have equal and inclusive education (Petterson 2017). Equal and inclusive education is featured by "actions and strategies based on an acknowledgment of all pupils' equal rights and an accommodation of pupil diversity and needs" (Stenman and Pettersson 2020, p. 88). Digital technologies promote equity in education, but online teaching is not merely about digital technology access but the teachers' ability to enhance the teaching practices in digital environments. The advancement of digital technology demands teachers to develop sufficient skills needed to undertake online teaching. Teaching online during the pandemic is concerned with teachers' pedagogical individual/personal choice in adapting to the new context. It touches upon how to promote equal education in rural contexts. Vietnamese government makes effort to sustain equal and inclusive education during the pandemic through providing infrastructure support and training. Many schools and universities have offered support for buying laptops, accessing the internet, reducing tuition fees, and providing in-service training programs for using and integrating the new technologies (Pham and Ho 2020).

2.2 The Need for Developing ICT Capability for Teachers

A teacher is considered an agent of change (Guilherme 2002). In Western and Asian countries, teacher education and training programs prepare quality teaching forces for education reforms and initiatives to respond to globalisation and local challenges (Feuer et al. 2013; Zhang 2010; Tang 2011; Griffiths 2012). The promotion of language learning calls for the upskilling of language teachers (Conway et al. 2010; Nguyen 2019). The pandemic highlights the urgent need to initiate and embed online teaching in the curriculum permanently for the future (Maheshwari 2021). The necessity to promote effective

online teaching practices by improving teachers' capabilities is obvious. Teachers are confronted with the urgent need to use digital technology to adapt, reformulate, and exercise teaching practices.

The Vietnamese government and the MOET have made many attempts to foster ICT implementation in language teacher education. Recent years have seen ICT-related policies to promote teaching, training, and applying ICT, such as Decision No.117 on the approval of Project *"ICT Enhancement in Administration and Teaching-Learning Support, Scientific Research to Improve the Quality of Education and Training*" period 2016–2020 with 2025 orientation, and Decree No. 2268/CT-BGDĐT (MOET 2019). A large budget has been spent on building and improving technological facilities nationwide (Gruba and Nguyen 2019; Le and Vo 2014). Many training programs have been conducted to promote teachers' use of technology in language teaching.

Despite a lot of investment and effort, ICT integration in foreign language education has not been satisfactory (Vo and Mu 2020). Teachers' use of technology has been hindered by factors such as a lack of ICT requirements in the curriculum, a lack of guidelines on technology use, and insufficient communication and consultations among stakeholders (Gruba and Nguyen 2019). Online teaching becomes the focal concern of teacher education programs, yet it remains a challenge in teacher education (McGarr and Gallchóir 2020). The academic attainment of ICT integration into English language teaching seems to lag behind developed countries. It has become necessary for teachers in Vietnam and worldwide to be better equipped for difficult and uncertain times in the future.

2.3 Benefits and Challenges of Online Teaching and Learning

Recent studies indicate both benefits and challenges of online teaching and learning. Teachers and students reported their preferences for online learning due to its convenience and flexibility to teachers and students (Dinh and Nguyen 2020; Maheshwari 2021) and the availability of necessary support for their online learning (Dinh and Nguyen 2020). Due to some key constraints, the online teaching and learning model has challenged students and teachers (Linh 2020). Problems with technology, namely, a lack of sufficient educational technologies, unstable, slow internet connection, and low-quality sound, have challenged students' participation and teaching practices (Dinh and Nguyen 2020; Lee 2020). The most common complaint being heard is the internet connection issue (Moorhouse et al. 2021). Vietnam is one of the low and middle-income countries with unequal access to wireless technology across the country (The World Bank 2020). The paucity of infrastructure is one of the main barriers to implementing technology in educational settings (Peeraer and Van Petegem 2011). Consequently, the attendance rate of high school students dropped to 60–80% during online learning (Maheshwari 2021). Other challenges include facilitating learner-to-learner interaction, gauging interest, and giving individual feedback (Dinh and Nguyen 2020; Rehn et al. 2018). Student learning and their learning intentions in the future are impacted by different learning styles, lack of self-confidence, poor internet connectivity, and underdeveloped instructional design (Maheshwari 2021). Users' information may be stolen because of security vulnerabilities (Lee 2020).

The implementation of technology necessarily involves the availability of technological facilities. Technical solutions are considered prerequisites for synchronous online teaching (Moorhouse et al. 2021), yet providing sufficient technological tools does not equate with technology integration in the classroom (Ward 2003). Insufficient technology-related training or experience makes teachers feel unprepared and anxious (Rehn et al. 2018). Teachers' ICT literacy remains limited to their performance of basic skills such as word processing or creating a presentation (Peeraer and Van Petegem 2011). Therefore, it is necessary to enhance the teachers' capacity to integrate ICT in the classroom. As a result, the benefits of online learning in comparison with face-to-face learning have been questioned by many students (Nguyen and Pham 2020).

Teacher reflection plays a significant role in integrating theory and practice in language teacher education programs (Farrell 2019; Hartford and MacRuairc 2008; Komur 2010). Reflective language teaching is essential for language teacher education programs worldwide (Farrell 2015). It is a bottom-up approach to teacher professional development based on the belief that experienced and novice language teachers can enhance their understanding of their teaching through a conscious and systematic reflection of their teaching experiences. Wen and Wu (2017) argued that the training for teachers should focus on teachers' reflection based on independently made professional judgements, and by doing this, sustainable professional development can be achieved. Therefore, it is pivotal for teacher reflection to be included in any teacher training program, and the ability to reflect should be integral in language teachers' teaching practices and digital competencies in foreign language education in Vietnam.

3 Methodology

3.1 Theoretical Framework

According to Creswell and Miller (2000), the appropriateness of a research approach is conditional upon research purposes. Qualitative research methods were employed because they are suitable for studies in which findings are grounded in the participants' voices and enable research participants to understand reality by interpreting their experiences. Also, there is no one-size-fits-all methodology that can be fully employed in a specific research; therefore, the researchers' approach is to rely on the aims of this study to combine different methods of collecting and analysing data.

This study aims to provide in-depth picture of the complicated online teaching process and offering insights into FL teachers' specific experiences. The theoretical framework linked to the research method is the *Interpretative Phenomenological Analysis (IPA)*. IPA was chosen because it is the most participant-oriented method to reflect significant and meaningful incidents or events that are both positively and negatively experienced (Alase 2017). This approach is expected to shed light on the complexity and commonalities of educators' teaching experience. However, IPA is appropriate for exploring phenomena occurring in small populations (Tuffour, 2017), and need further combination with other qualitative methodologies to achieve generalisability (Chen and Le 2021). In this study, IPA functions as a general research design to encompass other collection and analysis methods. The adoption of critical incident techniques and semi-structured interviews as data collection techniques and an adapted model for the data

analysis fits the study because it draws on the merits of each technique to disclose the full picture of the online teaching process.

3.2 Data Collection Techniques

Adopting *The Critical Incident Technique (CIT) (*Flanagan (1954) and semi-structured interviews, the researchers expect to gain insights into all the factors that are at play when teachers teach online. These include teachers' knowledge, understanding, and capabilities in digital tools, philosophical attitudes, values, and pedagogical beliefs. These techniques enable participants to reflect on their journey of understanding how they have been transformed, from reservation and struggles in the early stage to the satisfaction stage, when they can enjoy the benefits of integrating online technologies into their teaching.

CIT has been widely used as a qualitative research method to explore events, incidents, factors, and experiences of a specific situation or event (Butterfield et al. 2005). CIT is featured by the retrospective nature, which is conceived as a valuable reflective tool for teachers to recall experiences by their own words and to help them learn from practice (Chen and Le 2021). This method has proved its validity in studies exploring aspects of a process. Given these benefits, this research adopted the CIT as one of the data collection methods. As a retrospective self-report is the most productive form of report for "digging out" the experiences, self-reports were delivered to explore factors that helped and hindered the participants teaching online during the COVID-19 pandemic. The report was divided into two parts. The first part generated teachers' demographic information such as age, qualification, and length of service. The second part provided instructions to students on writing the critical incident using a set of critical questions about *what, how,* and *why* related to the critical incident.

Apart from CIT, a semi-structured interview was considered appropriate in promoting the participants' fruitful reflection. As the most commonly used method in a IPA study, semi-structured interview can encourage interviewees to share their learning experiences freely and help the researchers get close to the interviewees' perceptions, emotions, and judgments (Chen and Le 2021). One-on-one, face-to-face interviews were conducted at the same time as collecting incidents as an alternative option for participants. All interviews were organised in telephone interviews or one-to-one video conferencing via Zoom, Skype and Facetime. These modes of collecting data afforded the interviewees the freedom to express their thoughts and provided the flexibility for the researchers to monitor the whole process. Each participant was given the consent forms which listed all the details of the research project, ethical issues, and other matters of concern. The participants were aware of their role in the project. It was their freedom of choice to attend or withdraw from the interviews. On average, interviews were scheduled for 25 to 30 min. However, some interviews took longer as participants were so excited to recall their memories that they deviated from the research topic. It was assumed that the respondents would provide short or insufficient information, some prompt questions were prepared for eliciting from or elaborating on their minimal responses.

3.3 Sampling and Selection of Participants

Sampling in this qualitative research is strategic and purposeful. As Flanagan (1954) stressed, the sample size is manifested by the number of critical incidents rather than participants. From the data collected from the 20 participants, a total of 5 self-reports or 15 interview transcripts were collected. These 15 interview transcripts were divided into 25 small segments (mentioned as excerpts in the discussion). The themes/categories that emerged were arranged into five themed stories and 25 interview excerpts depicting teachers' experiences.

The sample was chosen for opportunistic convenience, based on the researchers' access to the individual teachers and their willingness to participate in the study as a result of the authors' relationships. The 20 upper secondary school teachers were involved in the study. They teach foreign languages, namely English, French, Chinese, and Thai, in both urban and remote areas in the northern region of Vietnam. The demographic characteristics of participants are demonstrated in Table 1.

Table 1. Demographic characteristic of participants (n = 20)

Demographic	Category	N (%)
Gender	Male	8 (40%)
	Female	12 (60%)
Age	22–29	4 (20%)
	30–39	10 (50%)
	40+	6 (30%)
Qualification	Bachelor	7 (35%)
	Master	13 (65%)
Level of schooling	Upper-secondary	20 (100%)
Location of school	Urban	4 (20%)
	Remote	8 (40%)
	Rural	8 (40%)
Major of teaching	English	11 (55%)
	French	3 (15%)
	Chinese	4 (20%)
	Thai	2 (10%)

Most of the participants were friends, previous school teachers, or acquaintances of one author of this book. These personal relationships allowed the authors to gain more rich data in a study that takes the participants' time and devotion to write narratives and be interviewed. They felt more secure when their experiences were audio-taped, knowing that their stories would not be misused.

3.4 Data Process and Analysis

An adapted model, which Chen and Le (2021) proposed, was employed for the data analysis. This model combines the original techniques used by Flanagan (1954), a four-step approach of qualitative content analysis (Papouli 2016), the IPA six-phase thematic analysis (Braun and Clarke 2006), and the technique developed by Vianden (2012). After the data were collected, general categories and subcategories were extracted for case-by-case analysis. The data analysis process in this study involved five phases: (1) *Arranging the raw data* through transcribing texts, reading/re-reading the data, jotting down initial working topics or ideas, forming the unit of analysis by each critical incident, and assigning a unique serial number to each incident; (2) *Generating initial themes basing on the* data for identifying 'descriptive' themes; (3) *Creating themes and subordinate themes; (4) Interpreting the data,* involving the researchers' more in-depth engagement with the data for a complete interpretation of participants' interpretations, perceptions, and emotions; and (5) *Producing the report* which involves selecting rich and compelling text extracts relating to the research question and literature, grouping themes, and winding up the analysis. The findings were compared with previous literature on the experience of Vietnamese teachers. For anonymity, all identifiable personal names of people, institutions, or places were deleted, and the participants' names were replaced with pseudonyms.

4 Findings and Discussions

This section is devoted to reporting the key findings that describe FL teachers' online teaching experience. The findings have been organised according to the subject matter, illustrated by stories and excerpts. Most typical stories were chosen to illustrate the ideas under discussion. Thus at times, we have combined and integrated material that has been taken from several incidents. The data is presented under three interrelated themes and subthemes, and we will look at each in turn.

4.1 Key Stressors of Online Teaching as Perceived by Teachers

Story 1. "I do not like teaching online because I have much stress": Ha, female, 53 years old, Bachelor's degree, teaching English at a gifted upper secondary school in a mountainous province

> *Online teaching is challenging to low self-disciplined and lazy students, who often make excuses related to the camera. Their excuses are often like "I use a desktop without a camera," "My camera on my phone is out of order," "I am late because of my internet connection." I could not check if they were telling the truth, so I had to accept these excuses. Online classes often expect absent students who cannot attend due to technical issues. I locked the online room to disable late students from entering to maintain discipline. Moreover, these students would be marked absent for that day. I have to talk more than in a face-to-face class when teaching online. I have more stress when teaching online. There were also times when I was so passionate about delivering my well-prepared lessons, but my students were not interested in them.*

In her story, Ha reported multiple challenges supporting her negative online teaching experience: the lack of sufficient technological devices and internet disconnection. This research demonstrates that the biggest complaint of online teaching is related to technical issues. All 20 studied teachers mentioned technical-related phrases such as "internet lag," "internet instability," "slow connection," "breakdown," or "low internet quality." These problems either come from the student or teacher's side, as presented in the following excerpts:

*Working from home was distracting and annoying because my children were not quiet. They often bothered me with a lot of questions or requests. Sometimes I had internet breakdown problems due to his kick on the Wi-Fi modem***.**

[**Excerpt 1**: Mai]

I was overwhelmed with various digital tools and annoyed with technical problems such as internet lag and students' lack of laptops or smartphones.

[**Excerpt 2**: Lan]

The biggest obstacle was the internet instability, which troubled both my students and me. Students have unequal access to mobile devices in my province, so some had to share a laptop or smartphone to attend online lessons.

[**Excerpt 3**: Thi]

Students' lack of necessary electronic devices with good internet connection contributes to students' hesitancy to access online education. The data of this research confirms the previous studies (e.g., Dinh and Nguyen 2020; Moorhouse et al. 2021; Lee 2020) on the issue of internet connection identified as the most common complaint among teachers. Another technical issue challenging students and teachers is time-consuming registration. Some teachers have argued that access to educational technologies and electronic devices are prerequisites for online learning. The schools need to ensure that students are provided with the necessary facilities to implement online teaching. The data indicated that some teachers were provided insufficient school-level support in both technological infrastructure and professional training:

Although I can use some available free online tools for my teaching, they are restricted to the time and functions. The school only gave us a free Zoom version, which was only 40 min, while a period lasted 45 min. I had to buy the Zoom Pro to cater to my big class. We, teachers, do not have money and should be provided all the facilities to facilitate our teaching. The technological tools are like the necessary facilities for virtual classes.

[**Excerpt 4**: Linh]

Teachers and students were not trained to teach and study online and found it hard to learn in this environment.

[**Excerpt 5**: Hung]

While maintaining that technical issues are annoying, Hoa attributes her most significant challenge to her low proficiency in managing an online classroom, including the management of the behaviour, attention, interest, engagement, and performance of students:

> *The biggest challenge is online classroom management, especially monitoring the behaviour and engagement of students. It is hard to control students' attention to my lesson. Attracting their interest and interaction took much effort because they were often involved in personal tasks without focusing on the lesson. I organised students in break rooms in the class, but it was hard to monitor their work performance.*
>
> [**Excerpt 6**: Hoa]

Story 2. "Communication with students via a screen makes me depressed": Hong, female, 40 years old, Master's degree, teaching French at a gifted upper secondary school in an urban area.

Although Hong supports online teaching, she is not satisfied with the online interactions because of some disadvantages:

> *Online teaching takes away the merits of physical interaction. Communication via a screen often makes me depressed. I want to see their face, make eye contact, and receive instant responses from students rather than pauses most of the time. I do not mandate them to turn on the cameras, but I want to see their face. Furthermore, I also found that my students want to see my face.*

This finding is evidence for the argument that the social connection between the learners and the teacher can "engage the learner in deeper cognitive processing of the material presented, thus leading to enhanced learning" (Wang et al. 2020, p. 2). During online teaching, both students and teachers are attracted to faces, and it was indicated that 75.66% of learners' attention focused more on the teacher's face (Pi and Hong 2016). Looking at the teacher's face makes learners feel more connected, which helps enhance students' satisfaction and learning (Wang et al. 2020).

Online interaction arouses the interest of almost all participants. Insufficient interaction is the most significant disadvantage for Hong. While Hong laments that the interaction between student and student is challenging during online teaching, other teachers as Hoa and Hai identify the weakness of the interaction between student and student when teaching online:

> *Sometimes, I was upset because the interactions were not prompt. I was so stressed when calling a student randomly, but she or he did not respond. Sometimes it was because of the internet, and in some situations, that student was not present (maybe doing something else). The thought that they did not respect me, their teacher, made me angry and stressed. I asked my students to turn on the cameras to observe their presence and attention.*
>
> [**Excerpt 7**: Hoa]

I prefer face-to-face teaching to online teaching because the interactions are weak. The student-student interaction cannot be monitored. Sometimes, I received only silence when I tried to warm up by eliciting answers. I had to answer by myself.

[**Excerpt 8**: Hai]

Bao, a 50-year-old male teacher, shares a similar idea with Hoa when associating the low online class interaction with the internet connection. He also added that the teacher-student interaction was problematic due to his incompetent technological skills:

I have a problem interacting with my students because I am not competent in using technologies. I am slow and dumb. When I shared my screen with students, I could not see their faces, and I found it hard to supervise their participation and study engagement. I asked students to take a photo of their notebook to send me to resolve this.

[**Excerpt 9**: Bao]

12 out of 20 teachers claimed that their big class size (44–45 students) prevented them from benefitting all students. Hoa argued that gamification was helpful but only limited to those joining because of the big class. Class size may be a barrier to using technology in engaging students in interactive activities. Small classes are perfect for conducting learner-centred activities (Wright et al. 2019) and enriching student-student interaction and teacher-student interaction (Deutsch 2003).

In addition to critical stressors of online teaching, such as the issues of technology and online classroom interaction management, the participants reported their emotional and mental distress as their psychological challenges caused by online teaching. In addition to internet instability, Trang had a problem with students not responding to her questions. She expressed one of her challenges being how to regulate anger that arose from that situation. Her stress was coupled with students' low motivation and neglect. Trang was upset with some students who turned on the laptop for a live lesson while playing games on their smartphones at the same time. Most of the research participants agreed that online teaching challenges students lacking self-discipline.

When teachers experience a shift from face-to-face teaching to online teaching, the adaptation can take shorter for this teacher and longer for the other. This shift often triggers emotional challenges for teachers, which should not be overlooked. Coupled with personal stress, strain, uncertainty, and doubts due to the pandemic, is psychological distress from online teaching. This issue should be mitigated, as chronic stress affects a person's wellbeing (Lau 2019). Emotional support is needed to reduce the burdens of teachers in these difficult times. It should be an integral part of support at different levels to deal with personal issues blocking their teaching success. As there has been a claim of emotional support from the schools, this current study gives rise to a need of providing teachers with emotional support in their future teaching practices.

This research also showed that constraining factors of online teaching are partly attributed to sociocultural reasons. Deep-rooted beliefs of traditional teaching cause teachers' hesitancy and problems in transforming teaching programs into online formats. Aging teachers like Hoa and Bao have been familiar with teacher-centred teaching methods, conceptualising their role as knowledge transmitters. A teacher is a master who

is supposed to know everything, a conduit who transmits knowledge to students (Chen and Le 2019). These teachers adopted technology to enhance teachers' presentations rather than adapt their teaching methods to suit online teaching needs. The following excerpts illustrate why online teaching in Vietnam is in its infancy stage, and changing and promoting online teaching practices should start from raising teachers' awareness and changing their beliefs.

Face-To-Face traditional teaching with interactions between teachers and students, familiar for many years, is the most effective educational method.

[**Excerpt 10**: Nga]

Online education is beneficial for students with self-discipline.

[**Excerpt 11**: Hue]

Online lessons would be more beneficial for university rather than school students.

[**Excerpt 12**: Tan]

Online teaching was not favoured by Vietnamese students who do not have the habit of self-study and research.

[**Excerpt 13**: Hai]

Online classes offer a lower volume of knowledge transferred to students and teacher-student interaction.

[**Excerpt 14**: Ha]

The data indicated multiple challenges of online teaching: insufficient infrastructure for online teaching, teachers' low ICT proficiency, and inappropriate pedagogies in integrating ICT in teaching online. As a result, the teachers express their reservations about online teaching. For them, it is supplementary to the face-to-face teaching mode. The hesitancy, the lack of knowledge and skills in using technology in an online classroom context is a significant stumbling block for effective technology integration. This finding implies the promotion of teachers' awareness and ICT-related pedagogical strategies to adapt to online education.

4.2 Understanding Teacher's Transformation

This section explores the foundations for successful online teaching experiences. The transformation can happen around various aspects such as skills, knowledge, perceptions, and pedagogy. The data analysis shows that teachers have experienced the transformation in various aspects. The most rewarding transformation is teachers learn how to teach online using technologies, in parallel with the knowledge and techniques. New techniques and skills were obtained to create an engaging lesson and enhance students' learning outcomes. For many teachers, online teaching during the pandemic is considered an adaptation journey. They transplanted from well-adapted soil conditions, their standard face-to-face mode of delivery to an alien virtual teaching environment. The flowing

two stories present different aspects and constructs of teachers' pedagogical transformation, and Phan experienced changes in ICT-related knowledge and skills. They learned how to use various online tools and strategies for online teaching, especially in teaching language skills.

Story 3. Li, female, 41 years old, Master's degree, teaching Chinese in an upper secondary school in a rural area

Since 2020 when the pandemic happened, Li has delivered virtual classrooms via Zoom, MS Teams, or Google Meet. She had to update all the technological skills, tools, and techniques that could empower her to handle the teaching effectively. Her teaching was combined with other technologies to accommodate a broader range of learners. She has utilised Zoom and combined it with additional tools such as a student response system (for example, Mentimeter) or a game-based learning platform to increase the variety of activities. Lessons are made more engaging and interactive through Quizizz, PowerPoint games, YouTube videos such as TED talks, and open educational resources in the form of short lectures, animations, simulations. Different tools and methods were employed to meet students' needs and competence. For example, for reading online lessons, pre-reading activities involve Quizlet, Classtools.net, and Quizizz. Interactive vocabulary worksheets or word games helped provide input in teaching speaking. The online board helps students brainstorm and make mind maps. She created slides to guide direct instruction and shared the slides during her delivery. She used the chat box for all assignments and two-way interaction between students and teachers. For students who are not used to online lessons, she simplified by not teaching new language areas, so the focus was placed on familiarisation of Zoom and its features. For higher competent students, she recorded a lecture, provided access to videos, readings, open education resources, quizzes, which they could work through before the class. Classroom time was spent on in-class interaction through discussion, problem-solving, and case studies.

It can be learned from Li's story that she has developed a lot of ICT-related knowledge, skills, experience, and pedagogical strategies in using technological tools and resources. Li described her experience delivering her lesson in an asynchronous virtual environment. She also presented an innovative approach that she has developed to adapt to the differences inherent in this modality. She also demonstrates her competence in supporting diverse student needs in a virtual environment. This teacher has been adapted and excelled in her teaching practices.

Story 4. Phan, male, 38 years old, Master's degree, teaching English in an upper secondary school in a mountainous area

Phan shared that he had more technical knowledge and developed many new digital skills. He learned about the functions of some educational technologies such as Zoom and Google Meet, and then he gradually mastered using Zoom and other software. He could then integrate all interactive activities in his lesson and show everything to the students. Phan adopted some tools for different purposes: connecting with students via Facebook group and Gmail, checking attendance via Mentimeter monitoring students' self-study via Google Classroom, ClassDojo, Azota, Edmodo, interacting interact better with students using random name picker, dividing groups (random steam generator), Kahoot!, Quizizz, Educandy, Zoom Poll, Mentimeter, Pollverywhere, Nearpod, Slido, Google Jamboard, miro.com, assessing how well they have acquired today lesson's

knowledge by interactive worksheets. Phan saw the immense benefits of online teaching for both teachers and students:

> *I find the potential benefits of using technology in teaching all language skills, mainly speaking skills. The excellent sound quality and quiet learning environment improve students' speaking skills and confidence. Their anxiety was eliminated when they could focus on producing mini speeches. I often use games and video clips to teach vocabulary. Teaching all the English language skills is easier because I can use a lot of visual aids. My lesson often starts in the order: warm-up with games, giving lectures, and revising. I often assign my students to create a video clip of their presentations and send me for assessment. I could directly mark and comment on the worksheets, and students can see that.*

According to Phan, online teaching allows him to explore various learning sources, enabling him to design lessons more creatively and interestingly. The introduction of many applications and specialised software demands his flexibility and creativity in delivering his lessons. As a team leader, Phan had to self-study, reflect, and mentor other teaching staff by designing videos for training. The attainment of both knowledge and ICT literacy is the most significant benefit.

Li and Phan are two teachers who had positive experiences and expressed their willingness to continue online teaching. Their awareness of the benefits of online teaching leads to their frequent use of technology in their lessons. They often share with other teachers and maintain contacts via social media to create teacher networks. As a result, they appreciate and understand the benefits and importance of using ICT in teaching. This finding supports the argument that sound experience of technology leads to confidence and competence in using technology (Claro et al. 2018).

Linh and Phan represent other teachers whose experience shifted from negative feelings ("panicked," "so stressful," "shocked," and "overwhelmed") to fulfilment and enjoyment. Almost all the respondents experienced transformation in their attitudes, skills, and teaching practices. They had their reservations regarding the effectiveness of online teaching, but gradually they developed their satisfaction and changed their attitudes towards online teaching:

> *Although I had to work harder to cater to the online learning needs, I developed my satisfaction and commitment to online teaching. My teacher talk increased to 60-70 per cent compared to 40-50 per cent in face-to-face teaching.*
>
> [**Excerpt 15**: Binh]

> *I see numerous benefits of online teaching. Using technology makes online lessons more vivid and exciting. Now I can say I enjoy it. After all, I have adapted to a new method.*
>
> [**Excerpt 16**: Nhung]

> *I was overwhelmed with various digital tools and annoyed with technical problems such as internet lag and the lack of facilities. Online teaching did not interest me at all. I gradually saw numerous advantages of available technologies facilitating my*

teaching and assessment. My attitudes towards online teaching and my teaching skills have changed positively.

[**Excerpt 17**: Tu]

Besides their overall positive feelings and attitudes toward online teaching due to the more flexibility online teaching has brought, some teachers also experienced exciting experiences. These moments of excitement have positive impacts on their preference for this mode of teaching.

Sometimes I did not have time to do the make-up, or there were days I had some acne on my face. I turned off the camera.

[**Excerpt 18**: Hoa]

I was so enthusiastic and had a mono talk for a while until I found out that I had not turned on the microphone. When I was lecturing, my son asked me something, so my students heard his voice.

[**Excerpt 19**: Tung]

4.3 Factors Contributing to Teachers' Positive Experiences

This section attempts to explain the foundations for successful online teaching experiences. This study has highlighted that combined teacher-level and school-level factors enhance technology integration into teaching English.

Story 5. Vu, male, 40 years old, Master's degree, teaching English at a gifted upper secondary school in a mountainous area

Vu is a dedicated teacher who keeps striving for excellence in online teaching. He has had much experience using technology to teach English language skills for years. He has invested money and time exploring other online tools that suit his practice and meet the diverse needs of his students:

I have been familiar with technological resources, tools, skills, and methods for years, so I have no trouble shifting into online teaching in response to the pandemic. I can say I have no painful experience. Based on my storage of materials and tools available, I just need to adapt my materials and methods to be suited to online lessons. My ICT competence empowers my smooth transition into a new model. While some of my colleagues still struggle with converting pdf files into word files, I have mastered many editing tools.

One of his successful teaching techniques is using peer assessment as an interaction booster:

I ask small groups to assess other groups when I teach presentation skills. The form was given to each group with assessment criteria, comments, and marks.

Recent studies suggest that peer feedback has positive impacts on student interaction. It enables interaction between students and their knowledge through reconceptualising,

integrating, and recreating previous knowledge, experiences, and work (Ion et al. 2018). Rating or commenting on the peer work helps them reflect their work, learn the criteria for assessing the quality of the work (To and Panadero 2019), or reflect their peers' comments to understand their shortcomings" (Wanner and Palmer 2018). Vu also adopted individualistic pedagogies:

> *I assigned more challenging tasks to proficient students and easier ones to students who learn English as a compulsory subject and are less capable. I focus on grammar and vocabulary exercises for these students rather than communicative activities.*

Vu called for trust and connection between teachers and students because this closeness is significant for online teaching. His idea seems similar to that of Stenman and Pettersson. These researchers argued that creating a relational closeness with the learner makes the learner feel confident, which positively impacts the learning outcomes (Stenman and Pettersson 2020). Vu's story confirms the previous research findings, which suggest that the more technologically and pedagogically competent teachers, the more willing they are to use ICT in the classroom (Darling-Aduana and Heinrich 2018; Maican et al. 2019; Sit 2021). Teachers who are ICT-minded, enthusiastic, or innovative can integrate technology into their teaching practice.

Teacher's resilience, defined as "the ability to cope with adversity and overcome the most challenging circumstances" (Hassinger and Plourde 2005, p. 319), empowers teachers to overcome challenges of the pandemic to make the pedagogical adaptation. Thao, a young female teacher, showed her awareness and made sense of the adversity. She expressed the ability to manage adverse situations and to find meaningfulness by rearticulating her way of knowing from within:

> *At first, I was shocked and overwhelmed by that sudden change. I was not interested and felt that I would not be able to cope with that. I was sceptical about the success of this delivery. I was struggling because I did not know anything about Zoom, and we teachers did not receive any support in terms of infrastructure, technical support, or pedagogical. It was like we had to swim in the sea. We were forced to adopt a new teaching model and were unsure if we could handle it, and students would be interested. Many teachers, including me, complained a lot. I had no choice but to learn something new. Nevertheless, thanks to that, I had the motivation to self-study and explored all about Zoom's functions.*
>
> [**Excerpt 20**: Thao]

Also, in this current study, support from schools and the municipal authorities is identified as a foundation for successful online teaching. The following excerpts present various supports that contribute to the positive experience and successful teaching experience during the pandemic:

> *The teachers have free access to some platforms (OLM, Zoom, Google Meet) that provide systematic guides for using technology to teach foreign languages. Teachers and students are provided with the links and codes for joining the Zoom classes. All necessary classroom management tools were available for teachers*

to use and assess students' achievement. The financial support of 500 USD per student is available for disadvantaged students. This province's policy is issued to help students gain equal access to online education. For teachers who must undertake quarantine in quarantine centres, internet connection is made available to maintain the new normal of teaching and learning during the pandemic so that their students are not lagged.

[**Excerpt 21**: Lam]

The local authority synchronised the technological system (Microsoft Teams), which has numerous functions and is user-friendly. Having the learning management system installed for all the teachers and students, we are freed from the stress of considering different technological tools. We do not have to worry about time limitations like the previous free version of Zoom. Also, experts are invited to have seminars and training sessions on utilising software to design online lessons.

[**Excerpt 22**: Hai]

Teachers are required to enrol in a training course about using video conferencing such as MS Teams, Google Meet, and Zoom to deliver online lessons and utilise online digital teaching tools such as Google Forms, Microsoft Forms, Edulastics, Classmaker to assess students' learning outcomes. We know more about successful online teaching strategies and learn from experts with extensive practical experience with online educational technologies to apply in our teaching practices.

[**Excerpt 23**: Tra]

Having all software installed by the school organisation was a significant advantage for teachers to save time exploring others.

[**Excerpt 24**: Chi]

Regarding the role of schools in rural areas, this study supports the results of previous research (e.g., Pettersson 2018; Stenman and Pettersson 2020) that school-level support is crucial for ensuring students' rights to equal education in rural areas.

In the following excerpt, Minh's continual reflection, constant updating of using technologies, and reflexive approach to integrating digital technologies into online teaching contributed to his fruitful experience. His self-reflection positively impacted his teaching practices, including his beliefs and understandings about online teaching. This teacher witnessed a process of evolution in his positions, shifting from a teacher passing the knowledge into an autonomous learner. He develops his proactive engagement in self-reflexivity, which allows him to understand his role as a teacher and a learner. Technologies transform teacher identity by enabling them to be active and creative:

After "trial and error," I have realised that it works best when conducting a lesson within this sequence: pre-live-lesson task, live lesson, and post-live-lesson task. Assigning a pre–live-lesson task helps the learners prepare for the lesson. When the learners are asked to share their answers to the pre–live-lesson task, I can

check their understanding of the task. It is helpful to have the learners submit their work ahead of the lesson so I can look at their responses and develop the lesson content based on their responses. Video or audio is included in live lessons for enhanced presentations and lectures. The post–live-lesson task is introduced during the live lesson to help the learners ask clarification questions. I post the recordings of lessons and assignments to Google Classroom.

I have become a better version than I used to be. I am more proactive and active. I force myself to learn every day because in ICT, if I do not speed up, I will be behind my students and my colleagues. I do not want to lose face and be inferior to my colleagues. I want to try my best to make my lesson exciting and inspiring. I am so happy and motivated if my students enjoy and engage in my lessons. I want to make them happy, so I have to invest more than I do in a face-to-face lesson. A 45-min online lesson equates 60-minute face-to-face lesson when it comes to my efforts and time. There were many new things that I was not familiar with in the past, but now I have mastered using them. I also join many online forums and groups to share and learn from other teachers. I can learn from others' experiences to improve myself. After nearly one year of adopting online teaching, I have gained a lot.

[**Excerpt 25**: Minh]

An exploration of teachers' experiences in this part indicates teachers' challenges of online teaching and critical factors contributing to positive experiences and successful teaching practices during the pandemic. The findings enable the proposal of an evidence-based teacher training model, which will be discussed in the next section.

4.4 Implications for Teacher Training: Developing Teacher's Pedagogical Digital Competence

As suggested from the findings, teachers' experience opportunities and limitations in school organisations' support for developing online teaching. The participants described this support as crucial for teachers' professional development. Therefore, infrastructure should be developed to support the development of digital learning environments. Teacher networks and communities should be created to enable sharing, learning, and gaining. Through sharing, they learn that they are "on the same boat": experience the same challenges, go through the same stages, and reach the same destination. Their problems are not unique, their circumstances are not weird, and even those of other cohort teachers teaching other disciplines may have been harder to handle. Receiving continual support and encouragement from different sources such as family, colleagues, and school management staff may mitigate the psychological challenges during online teaching. Available support plays a critical role in teachers' confidence and determination to continue with their choice of online teaching in the future.

A teacher should be a specialist in both the subject and pedagogy and a competent user of technology (Groff 2013; Luik et al. 2018; Sit and Guo 2019). Access to and knowledge about digital devices and online platforms, software, and tools are the foundation for any online education to be realised. Teachers also need to be upskilled in

their technology use and integration. Teacher awareness and reflection also positively impacted teaching practices, including beliefs and understandings about online teaching and the role of teachers in the teaching process. It can be learned from this study that all individual teachers were granted a relatively high autonomy in planning, adapting, and designing to suit the new context. There has not been a systematic framework as a guide for teachers in teaching and assessing learning outcomes. Although infrastructure is a prerequisite for online teaching, providing sufficient digital technologies does not equate with ICT-enhanced teaching. Therefore, it is necessary to enhance the teachers' capacity to integrate ICT in the classroom. Teachers are required to develop technological competence to adapt to online education; however, this competence has not been fully conceptualised (Moorhouse et al. 2021). Technological competence has been emphasised as one of the aims that need to be achieved in the light of building teacher capacity in English language teaching in Vietnam (Nguyen and Rensburg 2016). In this research project, we adopt a broader concept, "pedagogical digital competence" (PDC), which was defined as the ability to plan, implement, and continuously evaluate and revise ICT-supported learning activities (From 2017). PDC is an umbrella term that includes two sets of competencies.

Technological competencies: These competencies refer to technical aspects of technologies, including:

- Awareness of the role, benefits, challenges of technology and digital technologies and platforms in online teaching.
- Technological knowledge: knowledge about functions, techniques, technology, comparative knowledge about technological tools
- Skills in operating the technologies and tools

Online pedagogical competencies: These competencies refer to awareness, knowledge, and skills related to pedagogical aspects of technology and digital teaching tools, including.

- Online classroom management: manage time, managing students' participation and engagement, monitoring students' behaviour, marking and assessing students' outcome
- Online interaction management: managing teacher talk, monitoring, mediating, and assisting online interactive activities and classroom discussion, peer feedback

The following diagram summarises the PDC model (Fig. 1).

In parallel with the promotion of foreign language competence, the model also suggests that FL teacher training should prioritise the development of pedagogical digital competence. This attainment can be realised through two types of training. The first is *technical training,* which focuses on learning how to use technology. This stage provides digital literacy: how to use the technology and necessary skills to become ICT literate. It includes explanations and demonstration of various functions available, logging in difficulties, connection problems, hardware problems. This type of training commonly takes place at the beginning of a course. The second, *pedagogical training*, helps teachers understand how to better use educational technologies in online teaching and the

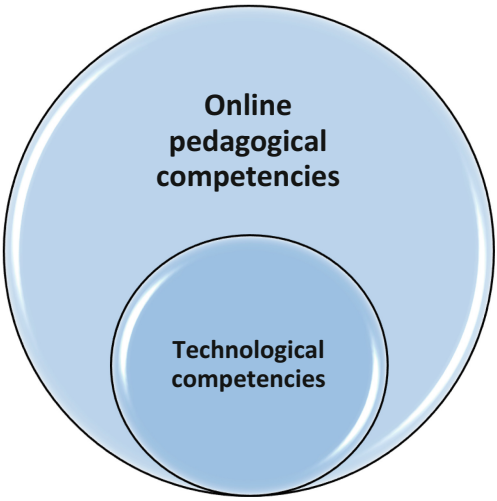

Fig. 1. Pedagogical digital competency model

underlying reasons for that use. Practical training and courses for using effective and user-friendly learning tools and platforms should be the focal concern of teacher professional development programs. Reflection on teaching pedagogies should be included in online teaching training courses. Interactive environments for teachers' reflection of experiences and practices should be encouraged. Shared technical infrastructure can ensure equal education and online teaching, and the choice of technology for online teaching should be decided in consultation with schools and teachers.

5 Conclusion

Digital transformation is an indispensable trend that no one can resist. Online teaching imposes different demands on school systems, teachers, and students, who seek to acquire not just a new system of teaching and learning but a new way of thinking. Online teaching can bridge the educational equity gap in disadvantaged areas given the satisfaction of two conditions: sufficient infrastructures for teaching online and competent teachers. Digital equity cannot equate with access to digital technologies or digital teaching tools. It is pivotal for teacher education to lead technology-related integration and training and reshape future technologically competent professionals. The emphasis should be placed on digital skills or ICT-enhanced teaching development above and beyond access.

As teaching and learning in Vietnam are not likely to be back to normal after the pandemic (BBC News 2021), teachers need to be prepared for change and bear in mind that any change or challenge brought by seemingly compelling circumstances involves transformations and personal development. The outbreak can be considered a good starting point for reshaping learning and teaching (Maheshwari 2021). Teachers must strive to overcome the digital divide and upscale digital skills to successfully support diverse student needs in a synchronous virtual teaching environment.

The current research has addressed the issue of online teaching, one of the most extensive areas of concern in Vietnamese education at all levels, from K-12 schools to tertiary institutions nationwide in general and in language teacher education in particular. An investigation into the experiences of upper secondary school teachers using the critical incident technique (CIT) and semi-structured interviews have provided insights to account for positive online teaching experiences. The study demonstrates that successful online teaching requires infrastructure development, and more importantly, teachers' pedagogical digital competence (PDC) for online teaching. The schools can provide organisational, technical, and pedagogical support to develop PDC and online teaching.

This study, being conducted among a small number of schools and teachers in Vietnam's northern provinces, should be seen as an attempt to explore aspects of online teaching. As this alternative method might become a permanent resolution for the future pedagogies, more extensive discussions and empirical studies might be needed at a national and international level, including localised evidence for how PDC can be advocated. Further research should be promoted to uncover how PDC constructs can better influence teachers' online teaching. Future researchers could also focus on broader questions around online teaching for equitable education in rural and remote regions. Reducing inequality by empowering teachers' competence would lift us to a better position to weather pandemics, future crises, or upcoming interruptions. Despite the limitations, the study findings should have wider implications for foreign language teacher educators, researchers, and practitioners and equally applicable to other contexts that may share similar social-cultural and educational settings with Vietnam.

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Teacher Support and Student Engagement in Digital Learning

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Abstract. Student engagement is an important aspect of digital learning. It is energized by motivation and explained by three basic needs in Self-determination theory (SDT). Teacher support distinguished in SDT was widely applied in face-to-face settings, but not digital learning, particularly in K12 context. We know very little how to support the needs of the young children in digital learning. Recently, the founders of SDT also stated that we need more studies to understand how to support students' needs in digital learning environments. Therefore, this study aims to investigate how well three teacher support dimensions distinguished in SDT – autonomy, structure, and involvement – encourage K12 student behavioral, cognitive, and emotional engagement. In this study, three hundred and thirty Grade Eight students learned for four weeks in distance learning using technology (refer to digital learning in this paper) and finished a questionnaire on perceived teacher support and their engagement. Stepwise multiple regression models were used to analyze the data. The two major findings are teacher involvement is the most influential predictor and autonomy support has less effect. Two plausible explanations are (i) teacher-student relationships are more important in digital learning due to the school nature and (ii) teachers can support autonomy less in digital learning that offers more freedom learning. Experience due to its less structure.

Keywords: Digital learning · Self-determination theory · K-12 education · Student engagement · Teacher support

1 Introduction

As of 28 May 2020, approximately 1.73 billion students have been affected due to school closures in response to COVID-19 pandemic, impacting about 98.6% of the world's student population (UNESCO 2020, May 28). As a result, school education has changed dramatically, with the distinctive rise of the use of technology in distance learning, which refers to digital learning in this paper. The new contexts and environments are very different from classroom teaching, which has dramatically changed the way how students engage and learn. Student engagement is a necessary, but not sufficient, prerequisite for learning (Guo et al. 2014). It can be explained using the construct of motivation (Losier et al. 2001), energizes students to be engaged in a particular activity (Chiu and Lim

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2020). Self-determination theory (SDT) can explain human motivation (Ryan and Deci 2017) and posits that all individuals possess three fundamental psychological needs that move them to act or not to act – the needs for autonomy, relatedness, and competence. Environments support the three needs are more likely to engage students behaviorally, cognitively, and emotionally in learning (Reeve 2013).

As most of the related studies were conducted in higher education, we understand little about how K-12 school students engage in digital learning (e.g., using technology in asynchronous and synchronous learning, online and blended learning). Ryan and Dec (2020), the founders of SDT, stated that we need more studies to understand how to satisfy student need to motivate their engagement in digital learning. This study specifically seeks to uncover what factors related to teacher support dimensions encourage student engagement. It also aims to contribute to the theorization of engagement in digital learning using the framework of SDT.

2 Literature Review

2.1 Theoretical Background: Student Engagement and SDT

Student engagement refers to students' active involvement in educationally effective practices and their commitment to educational goals and learning (Reeve 2013). Student engagement that drives learning is a multidimensional construct that comprises three dimensions: behavioral engagement, cognitive engagement, and emotional engagement (Reeve 2013). Behavioral engagement refers to involvement in educational activities in terms of participation, effort, intensity, or persistence; cognitive engagement is defined as the extent to which students are willing and able to take on the learning task at hand; emotional engagement refers to the feelings that students have towards teachers, peers, learning activities and school experience, as well as their sense of belonging (Sinatra et al. 2015). The three dimensions of engagement correspond to the learning processes of acting, thinking, and feeling, respectively (Wang and Eccles 2012). Although these dimensions are not completely independent of one another, they can be operationalized and conceptualized as distinct (Sinatra et al. 2015). Motivation is seen as a prerequisite of student engagement in learning (Reeve 2013), which can be explained by SDT (Ryan and Deci 2017; Losier et al. 2001).

Autonomy refers to the need for freedom or perceived choice over one's action (Chiu 2017; Ryan and Deci 2017). In digital learning, students have the choice to determine what particular topics they wish to study, and how they wish to study, which, according to SDT, should lead to a feeling of autonomy. The psychological need for autonomy provides a motivational basis for students' behavioral engagement in a lesson (Skinner et al. 2008). Participants high in autonomy are also likely to enjoy their lessons (i.e., emotional engagement) (Skinner et al. 2008). Autonomy is also assumed to lead to more extensive cognitive engagement; however, this assumption has not been studied extensively (Rotgans and Schmidt 2011).

Relatedness refers to the sense or feeling of being connected to other people (Chiu 2017; Ryan and Deci 2017). Several studies have demonstrated that students' sense of relatedness can predict their behavioral and emotional engagement (Furrer and Skinner 2003). A sense of relatedness can encourage positive student feeling toward a lesson

(i.e., foster affective engagement), and motivate students to participate in the course activities (i.e., encourage behavioral engagement) (Furrer and Skinner 2003).

Competence refers to the need for a person to master one's pursuits or learning (Ryan and Deci 2017); hence it may be a critical motivation factor for students' cognitive engagement (Chiu and Churchill 2015, 2016; Chiu et al. 2020; Chiu and Lim 2020; Skinner et al. 2008). Competence may also provide a motivational basis for behavioral and emotional engagement because it is reasonable to assume that a sense of mastery about the topic being studied would encourage a learner to further participate in the course activities, as well as foster positive learner feelings about the course.

2.2 Teacher Support Dimensions and SDT

Teachers' practices play an important role in fostering student motivation, and teachers can accomplish this by encouraging student autonomy, providing for learning, and being involved interpersonally (Lietaert et al. 2015; Sierens et al. 2009). In line with SDT, the teaching practices are grouped into dimensions of autonomy support (autonomy), structure (competence), and involvement (relatedness) (Chiu 2021a, 2021b, 2022; Chiu and Chai 2020; Lietaert et al. 2015; Sierens et al. 2009; Vansteenkiste et al. 2009; Vollet et al. 2017).

Autonomy support implies encouraging and facilitating students to pursue their personal goals and supporting student endorsement of classroom behaviors. (Assor et al. 2002; Chiu and Chai 2020). Autonomy-supportive teachers will consider student perspectives, allow for choices around learning, give a rationale when the choice is constrained, avoid the use of controlling language and reduce unnecessary stress and demands on students (Katz and Assor 2007; Trenshaw et al. 2016). Students will make their own choices and decisions concerning their personal goals and self-efficacy, use their own voices to seek help, and in return feel empowered in learning (Katz and Assor 2007; Trenshaw et al. 2016).

The structure involves the communication of clear expectations to student behaviour (Sierens et al. 2009). Structuring teachers will provide strong guidance during lessons, make boundaries of learning activities (Chen and Jang 2010), give competence-relevant feedback, express confidence in student abilities (Reeve et al. 2004), and give effective learning materials for achieving desired outcomes (Chiu and Chai 2020; Chiu et al. 2020; Chiu and Mo 2017; Chiu and Lim 2020; Ng and Chiu 2017).

Involvement focuses on the type of teacher behaviors, including warmth, affection, and enjoyment, which are shown to develop a close and caring teacher-student relationship (Skinner et al. 2008). Involved teachers provide students with emotional and motivational support such as pedagogical caring, involvement closeness, acceptance, and help (Vollet et al. 2017). Students will feel more welcome, safe, efficacious, and autonomous. They will internalize their experience and evince greater engagement (Ryan and Deci 2017; Reeve 2013).

Accordingly, the three dimensions of teacher support: autonomy support, structure, and involvement - can satisfy student needs for autonomy, competence, and relatedness. This satisfaction will encourage students to internationalize their learning experience for more autonomous motivation. This motivation serves an energy for greater behavoiral (Furrer and Skinner 2003; Rotgans and Schmidt 2011), cognitive (Furrer and Skinner

2003; Skinner et al. 2008), and emotional (Furrer and Skinner 2003; Skinner et al. 2008) engagement.

In sum, although teacher autonomy support, structure, and involvement distinguished in SDT have been widely applied to optimize student learning in a face-to-face context such as classrooms and physical education (e.g., Ryan and Deci 2017; Standage et al. 2005); Ryan and Deci (2020) stated that we need to study how to support student need in digital learning for greater engagement. Teacher support dimensions are not applied to educational technology including digital learning: no teacher support dimensions specific to educational technology were derived from SDT.

3 This Study and Method

3.1 This Study

Collectively, this study has proposed a model of student engagement in digital learning from the SDT perspective, see Fig. 1. In the model, the three teacher support dimensions distinguished in SDT (e.g., Ryan and Deci 2017; Chiu 2021a, 2022; Vansteenkiste et al. 2009) are used to support students' needs for behavioral, cognitive, and behavioral engagement. They are (i) autonomy support – offering and recommending various digital resources (i.e., links, videos, and slides) and indicating their relevance), (ii) structure - providing clear learning objectives and guidelines, competence-relevant multimedia feedback in asynchronous forums, and (iii) involvement – interactive real-time lessons, a small teacher-student support group in instant message system or real-time lessons.

This study aims to explore the impact of teacher autonomy support, structure, involvement affect student behavioral, cognitive, and emotional engagement in digital learning in the K12 context. Accordingly, the research question is.

What are the possible relationships between teacher support dimensions and behavioral, cognitive, and emotional engagement dimensions in digital learning?

We hypothesized as follows:

(H1) Involvement and autonomy support will have significant and positive effects on behavioral engagement (Furrer and Skinner 2003; Rotgans and Schmidt 2011).
(H2) Involvement and structure will have significant and positive effects on cognitive engagement (Furrer and Skinner 2003; Skinner et al. 2008).
(H3) Involvement and structure will have significant and positive effects on emotional engagement (Furrer and Skinner 2003; Skinner et al. 2008).

3.2 Research Design and Participants

We conducted a purposeful sampling based on the broad categorization of academic ability of students, from the pool of 24 partnerships schools, to select 3 school participants. In particular, 210 Grade 8 students from each banding in the pool were randomly selected (Remark: high schools in Hong Kong are categorized into three bandings based on student academic achievement). The participants ranged in age from 11 to 16 years old with an average age of 13.1 years.

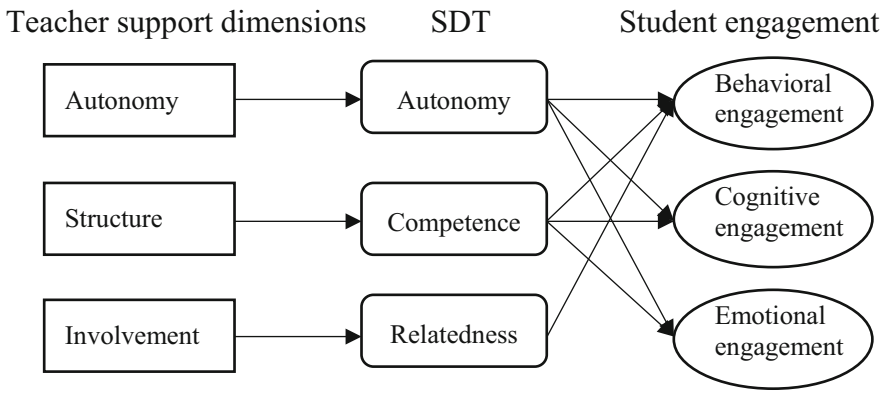

Fig. 1. A proposed model of student engagement in digital learning

3.3 Procedures and Measures

The study first obtained ethical approval from our university and got consent from the teachers, parents, and students, and gave three 3-h online training workshops on teacher support dimensions to the school-participants. A week after the workshops, the mathematics teachers used the teacher support dimensions to teach their students in distance learning during the pandemic for 4 weeks. Then, all the student participants finished 45 min self-reported questionnaire. In addition, eighteen items in the questionnaire reported were adopted by existing measures of perceived teacher support dimensions as well as behavioral, cognitive, and emotional engagement.

Perceived teacher support – autonomy, structure, and involvement. All of the items were adapted from Standage et al. (Standage et al., 2005) and modified. The three items for perceived teacher autonomy support (original reliability of $\alpha = .92$) included "My teacher encourages us to ask questions," and "My teacher answers my questions fully and carefully". The three items for perceived structure (original reliability of $\alpha = .84$) include "My teacher makes me feel like I am good at learning" and "I feel that my teacher likes us to do well". Moreover, the three items for perceived teacher involvement (original reliability of $\alpha = .88$) included, were "My teacher supports me" and "My teacher is interested in me".

Behavioral engagement in digital learning was measured using the three items from the study of Skinner et al. (2009). Their participants were school students who were in the same education level as the students in this study. Their items were modified to fit the research goal, for example, "When I'm in digital learning, I listen and read very carefully" and "I try hard to do well in digital learning activities". Emotional engagement was assessed using the three items from the study that behavioral engagement used (Skinner et al. 2009). For example, "When we work on something in digital learning, I feel interested", "This digital learning is fun". Cognitive engagement was measured by using three items adapted from the study of Wang et al. (2016). They validated and verified items to measure middle and high school students' cognitive engagement in science and mathematics. These items fit our participants and subject domains. For

example, "I go through the work for digital learning and make sure that it's right", and "I think about different ways to solve a problem".

3.4 Analytics Approach

Stepwise multiple regression models are used in the exploratory stages of model building to identify useful predictors based upon statistical criteria; hierarchical models are used to examine the contributions of predictors based on theory (Chiu and Hew 2018). As previously discussed, there is no well-recognized theory to understand the contributions of the teacher support dimensions for digital learning in the K12 context. Therefore, this study adopted stepwise multiple regression to analyze the data.

4 Results

All the assumptions were met in the analyses. The Cronbach alpha reliability values for various scales and subscales obtained were higher than 0.8. Correlations among all the variables were significant, all $p < 0.001$, see Table 1. Multicollinearity was checked and was well within accepted parameters (tolerance < 10.0 and VIF > 0.1).

Table 2 shows the findings related to the dependent variable behavioral engagement. At step 1, the independent variable involvement was entered into the regression model and was determined as significant with $F(1,328) = 140.99$, $p < 0.001$. This model accounted for approximately 30.00% of the variance, $R^2 = 0.30$. At step 2, independent variable autonomy support was entered into the model significantly with $F(2,327) = 87.24$, $p < 0.001$. This model accounted for approximately 35.00% of the variance, $R^2 = 0.35$. Hence, behavioral engagement was primarily predicted by involvement, and to a lesser extent by autonomy support. The structure of the model was insignificant.

Moreover, as Table 2 shown, the model entered structure and found it significant with $F(1,328) = 340.30$, $p < 0.001$ and accounted for approximately 51.00% of the variance of cognitive engagement, $R^2 = 0.51$. The model further entered the involvement significantly with $F(2,327) = 174.23$, $p < 0.001$, and accounted for approximately 52.00% of the variance of peer reviews, $R^2 = 0.52$. Hence, cognitive engagement was primarily determined by structure, and to a lesser extent by involvement. Autonomy support was insignificant.

Finally, the involvement was entered into the regression model for emotional engagement and found significant with $F(1,328) = 144.16$, $p < 0.001$. The model accounted for approximately 31.00% of the variance of the total score, $R2 = 0.31$. The model further entered structure significantly with $F(2,327) = 83.17$, $p < 0.001$. The model accounted for approximately 34.00% of the variance, $R2 = 0.34$. Hence, emotional engagement was primarily predicted by involvement, and to a lesser extent by structure. Autonomy support was not significant.

Table 1. Correlation matrix

	1	2	3	4
Dependent variable: Behavioral engagement				
1. Behavioral engagement		0.340***	0.200***	0.550***
2. Autonomy support			0.300***	0.230**
3. Structure				0.210***
4. Involvement				
Dependent variable: Cognitive engagement				
1. Cognitive engagement		0.220***	0.710***	0.230***
2. Autonomy support			0.300***	0.230***
3. Structure				0.210***
4. Involvement				
Dependent variable: Emotional engagement				
1. Emotional engagement		0.190***	0.290***	0.550***
2. Autonomy support			0.300***	0.230***
3. Structure				0.210***
4. Involvement				

Notes. ** $p < 0.01$; *** $p < 0.001$.

Table 2. Stepwise regression results of the second sample

Model	b	Beta	t	***p***
Dependent variable: Behavioral Engagement				
1. Involvement	0.58	0.55	11.87	<0.001
2. Involvement Autonomy support	0.53 0.28	0.50 0.22	10.83 4.87	<0.001 <0.001
Dependent variable: Cognitive Engagement				
1. Structure	0.69	0.71	18.45	<0.001
2. Structure Involvement	0.68 0.11	0.70 0.08	17.68 2.12	<0.001 0.34
Dependent variable: Emotional Engagement				
1. Involvement	0.59	0.55	12.01	<0.001
2. Involvement Structure	0.55 0.15	0.51 0.18	11.16 3.96	<0.001 <0.001

Notes. ** $p < 0.01$; *** $p < 0.001$

5 Discussions

This study aims to uncover how well the three teacher support dimensions – autonomy support, structure, and involvement encourage student behavioral, cognitive, and emotional engagement in the K12 setting. The findings yield two major empirical implications and one theoretical contribution.

5.1 Empirical Implications

The first empirical implication is that teachers' involvement is the most influential predictor of student engagement among the teacher support dimensions (H1–3), which is different from most relevant studies conducted in classrooms (Ryan and Deci 2017; Vansteenkiste et al. 2009). The plausible explanation of this finding is the nature of school education. In school education, students are young and take less control of how they spend their time and what they study. Their education is the responsibility of them, their teachers and parents. Therefore, teacher-student relationships (involvement and relatedness) play a very important role in their learning (Ryan and Deci 2017; Vansteenkiste et al. 2009). For example, teachers check students completed homework and remind them of their incomplete work. Teachers are trained in teaching methods to assist in imparting knowledge to students. Accordingly, the main reason for joining schools for students is to connect to schools, teachers, and students, rather than to learn subject knowledge. Moreover, the second empirical implication is the effect of teacher autonomy support was diminished (H1–3). A plausible explanation is that digital learning is less supervised (more autonomy support) and lacks physical human interactions (i.e., less relatedness support) (Chen and Jang 2010; Chiu and Hew 2018; Lam et al. 2018). The teacher autonomy support may not be relatively less important in a less supervised, i.e., students perceived more autonomy from digital learning. Teachers' efforts on autonomy support may be less effective.

5.2 Theoretical Contributions

The findings also contribute to the literature on teacher support dimensions rooted in SDT (Ryan and Deci 2017; Vansteenkiste et al. 2009). The theoretical contribution has shed light on how much the impact of three innate needs on student engagement dimensions varies in different contexts, by investigating the relationships between need satisfaction and student engagement in digital learning. In this study, the environments are online, which is very different from face-to-face lessons. This study suggested that the natural learning environment and the educational level of students determine the teacher support needs. It is because the student's psychological needs vary in the different education sectors and are partially supported by the environment.

5.3 Practical Suggestion

The practical suggestion is for schools and teachers to establish and activate an emergency transition to digital learning protocol in times of societal and/or public health

crisis. Our findings indicated that relatedness is the more important factor among the three needs in student engagement. Schools and teachers should kick off digital learning with supporting relatedness. Accordingly, this study suggests that schools should (i) redesign school timetables to provide students with digital space to socially interact with their teachers and peers to build a stronger sense of belonging; (ii) arrange mental health activities to let students express their emotions, such as sharing about life during school closure; and (iii) formulate digital teaching strategies or curriculum guidelines, such as establishing digital peer support groups, adopting "learning more and evaluating less" assessment approaches, and including more interdisciplinary learning activities.

6 Conclusions

Students are required to move their motivational orientation from extrinsic motivation to intrinsic motivation for better engagement in both face-to-face and digital learning settings (Ryan and Deci 2017). This study recommends the use of the proposed teacher digital support to motivate students to engage in digital learning. The author believes that more teacher digital support strategies need to be examined and the current findings extended to understand how educational technology is satisfying student needs in the context. The results of this study could also be extended by additional studies in different contexts, such as flipped learning and digital group learning (Chiu and Hew 2018). Finally, this study did not use a qualitative method such as interviews and portfolios to triangulate the quantitative results; more relevant future studies with mixed research methods should be undertaken to expand the findings.

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The Effects of Learning Analytics on Online Self-regulated Learning: A Meta Analysis

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Abstract. The present study aims to examine the effect of learning analytics on online self-regulated learning. A meta-analysis of research conducted on the relationship between learning analytics (LA) and online self-regulated learning (OSRL) over a 10-year period (2011–2021) was conducted. The moderating effects of learning environment, data resources and educational stage were also analyzed. Empirical studies which relates with LA and OSRL were systematically searched using Web of Science and Scopus. Twenty-two studies were included and random effects model was chosen in the current meta-analysis. Also, public bias and heterogeneity were examined. The result indicated that (1) learning analytics has a positive effect (r = 0.966) on online self-regulated learning, (2) relationship mining has a larger effect on online self-regulated learning compared with clustering and distillation of data for human judgment, (3) the log data is a critical method of collecting information in that it has a larger effect on OSRL compared with questionnaire and (4) the effect size of undergraduate students was larger than that of K-12 and graduate. Future research is needed to investigate different phases of online self-regulated learning and examine the difference between learning analytics effects on online self-regulated learning.

Keywords: Learning analytics · Online self-regulated learning · Meta-analysis

1 Introduction

Self-regulated learning (SRL), the foundation of quality of online learning, has received growing research attention over recent years. According to Zimmerman, self-regulated learning, sometimes called Metacognition, is the ability to monitor and control the process of learning (Zimmerman 1989). It plays an essential role in influencing online learning because a majority of students have shifted regular face-to-face lectures online since the outbreak of COVID-19 pandemic. Without the ability of self regulation, hardly could online learners set learning goals, adapt learning process and evaluate learning performances (National Academies of Sciences 2018). Therefore, much research has been carried out over the past 10 years about the influence factors of this research direction so as to enhance self-regulated learning.

Researchers have made some efforts about honing the ability of online self-regulated learning. For example, Marquès, with the aim of facilitating students' meta-cognitive

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strategy, applied an experimental research design and customized a questionnaire to collect data from 111 university students (Marquès 2021); Rivers evaluated how metacognitive skills affect online self-regulated learning and found that metacognitive skills have an indirect positive effect on achievement mediated through task definition (Rivers 2021); Hensley presented a framework intended to explain the impact of a sudden change of context to online instruction on students' engagement in self-regulated learning (Hensley 2021).

Although the existing literature has yielded some knowledge regarding the promotion of online self-regulated learning, a comprehensive research of online self regulation is still missing. What should be equally worth discussing is that the survey is the most common research method to collect data from a group of people. However, online self regulation is an ongoing process which includes several phases such as forethought, control, reaction and reflection (Pintrich 2004). But the survey is a method that could only gather and compile cross-sectional information, which fails to embody the dynamic process of online self-regulated learning. In order to fill this gap, much attention has been paid to learning analytics, which is a technology to unobtrusively collect trace data about the process of learners' cognitive abilities by log files, eye movement or audio data (Ferguson 2012).

The purposes of this study are, therefore, to investigate how learning analytics affect online self-regulated learning through meta-analysis. Meta-analysis is a statistical way to combine the results of different studies and calculate a weighted average. By identifying a common statistical measure, not only can we better discover the primary drivers of self-regulation, but also develop a compressive understanding of the relation between learning analytic and online self-regulated learning. The following section first explicates the theoretical framework to explain the characteristics of learning analytics and relations with online self-regulated learning. We then present the methods and results of meta-analysis. Lastly the discussion and future agenda are discussed.

2 Literature Review

2.1 Learning Analytics

Learning Analytics have triggered heated discussion in educational research in recent years, as a wealth of evidence suggests that learning analytics could ensure quality for academic performance, record learning logs and create learning models (Yamada 2016). For instance, Silva, with the purpose of enhancing the quality of education, applied learning analytics in teaching. In detail, by recording the students' interactions, analyzing data collection about learners and contexts, and making aware of the process of learners, teachers could have a better understanding of the effectiveness of pedagogical strategies (Silva 2018). Moreover, Shibani proposed a conceptual model that contextualized student-facing learning analytics tools, which was demonstrated to increase students' engagement and maximize learning effect (Shibani 2019). Additionally, Muslim designed a learning analytics platform which harnessed educational data and opened up lifelong learning opportunities. Online learners, major stakeholders, could pursue pre-defined learning goals, gain support for flexible definition and receive guidance of implementation details (Muslim 2016).

What are the specific methods of learning analytics? Initially, clustering is one of the key issues of learning analytics. It is the classification technique for dissimilar objects that group them in the same cluster. For example, in the attempt to cluster high-dimension data, Thrun utilized interactive projection-based clustering (IPBC) to incorporate user decisions into the same category (Thrun 2020). Furthermore, relationship mining is one of the most significant learning analytics methods for online learners including sequence pattern mining, process mining and correlations of different variables (Merceron 2015). To be more specific, Matcha extracted trace data to draw the relations between detected strategies and the established psychological constructs (Matcha et al. 2020). Thirdly, distillation of data for human judgment is a kind of learning analytics technology that could provide visualizations and statistics for online learners to fill the gap between sense of findings and real-life situation. Take learning analytics dashboard (LAD) for example. It is a visual display of the most important information that helps online learners make aware of the learning status anywhere and anytime (Kim 2016). The students who received dashboard treatment achieved higher scores than the control group, as illustrated by the experiment conducted by Kim.

2.2 Online Self-regulated Learning

In recent years, online self-regulated learning is a multidimensional construct that emphasizes the agency of learners (Li et al. 2018). Numerous studies have explored the essence of online self-regulated learning but there is still no consensus of the definition of it. In China, Yang (2011) and Kong (2012) suggested that online self-regulated learning is a strategy such as selective attention, coding and rehearsal. He (2017) regarded online self-regulated learning as a strength or ability that could be trained to improve its capacity. In western countries, some researchers suggest that online self-regulated learning is neither a strategy nor ability. Instead, it is a mechanism which seems to translate cognitive abilities into specific behavior (Zimmerman 1989; Harsel et al. 2021). Take a conceptual framework for assessing online self-regulated learning proposed by Pintrich (2004). It classifies different phases and areas for regulation. To explain it further, there are four phases, namely, forethought phase, monitoring phase, control phase and reflection phase. So online self-regulated learning is deemed as a process where different phases have different characteristics regarding cognition, motivation, behavior and context. While another perspective is to consider the online self-regulated learning as a product such as ability or strategy. Hence, scholars have not reached an agrefieement of how to dne online self-regulated learning. And a comprehensive understanding of online self-regulated learning is needed to settle this problem.

2.3 Learning Analytics and Online Self-regulated Learning

The goal of this study is to explore the effect sizes of learning analytics on online self-regulated learning. There is a growing body of empirical investigations and the observed effects are not homogeneous. To explain it further, most studies have made some efforts and found that there is a positive relationship between learning analytics and online self-regulated learning (Beheshitha et al. 2015; Tabuenca et al. 2015; Siadaty et al. 2016). Other studies, however, have found no significant effects of learning analytics on online

self-regulated learning (Viberg et al. 2020). So there is no clear consensus regarding the size and direction of the effects of learning analytics on online self-regulated learning. Despite the extensive former scholarly literature examining learning analytics and online self-regulated learning, one issue that remains less explored is that what factors moderate the relationship between learning analytics and online self-regulated learning. Therefore, this study adopts meta-analysis to systematically explore the effects of learning analytics on online self-regulated learning. In general, the moderators of meta-analysis could be categorized into context and measure factors (Lin 2011). Context factors relate with specific research condition such as learning environment and educational stage, while measure factors connect the way of collecting information such as data resources. As illustrated above, this study builds a theoretical model accordingly (Fig. 1).

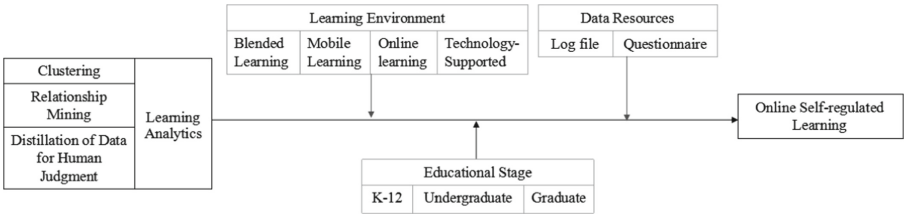

Fig. 1. Theoretical model regarding learning analytics and online self-regulated learning

3 Research Questions and Hypotheses

The purpose of this study is to explore any relationships that may exist between learning analytics and online self-regulated learning. Based on the reasons above, we proposed several research questions in this research direction. To begin with, what relationships exist, if any, between learning analytics and online self-regulated learning? Secondly, what, if any, factors moderate the relationship between learning analytics and online self-regulated learning? The following research questions were proposed.

- Learning analytics have a significant positive effect on online self-regulated learning.
- Clustering has a significant positive effect on online self-regulated learning.
- Relationship mining has a significant positive effect on online self-regulated learning.
- Distillation of data for human judgment has a significant positive effect on online self-regulated learning.
- Learning environment moderates the relationship between learning analytics and online self-regulated learning.
- Data resources moderate the relationship between learning analytics and online self-regulated learning.
- Educational stage moderates the relationship between learning analytics and online self-regulated learning.

4 Methods

4.1 Search Strategies

The meta-analysis begins by identifying articles that address issues regarding learning analytics and online self-regulated learning. We follow the two-stage approach suggested by Boell and Cecez (2015). After relevant articles are selected by the keyword search at the first stage, inclusion and exclusion criteria are applied at the second stage. The two-stage methodology could help reduce potential bias caused by the process of collecting data, thus increasing credibility (Fig. 2).

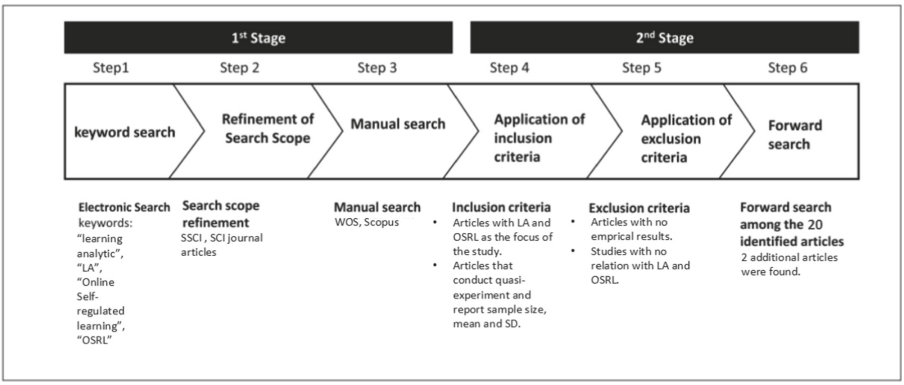

Fig. 2. Literature search and select process

The present meta-analysis begins with keyword search. Empirical studies were searched using WOS (Web of Science) and Scopus. The following keywords were used: "learning analytics", "LA", "online self-regulated learning" and "OSRL". Then we also searched through the reference list of the review article of learning analytics and online self-regulated learning. Using the keywords, we found 259 relevant articles published in the period of 2011–2021. Next, we refined the results by limiting the search to educational research. The selection criteria are (1) SSCI, SCI journal articles, (2) articles with LA and OSRL as the focus of the study, (3) quasi-experimental studies with a reported sample, the calculation of means and standard deviations (SD).

4.2 Inclusion and Exclusion Criteria

After literature search, we discussed the following inclusion and exclusion criteria: (1) Studies should focus on the relationship between learning analytics and online self-regulated learning. The article measured the construct of learning analytics such as clustering, relationship mining and distillation of data for human judgment. (2) Online self-regulated learning was presented as a major dependent variable measured by time investment, goal setting and self evaluation based on the research of Barnard (2009). (3) In order to ensure the quality of article, empirical studies should be conducted especially

for quasi-experiments. Also, empirical studies should report sample size, means and standard deviations. After literature screening (See Fig. 3), 22 empirical studies were collected.

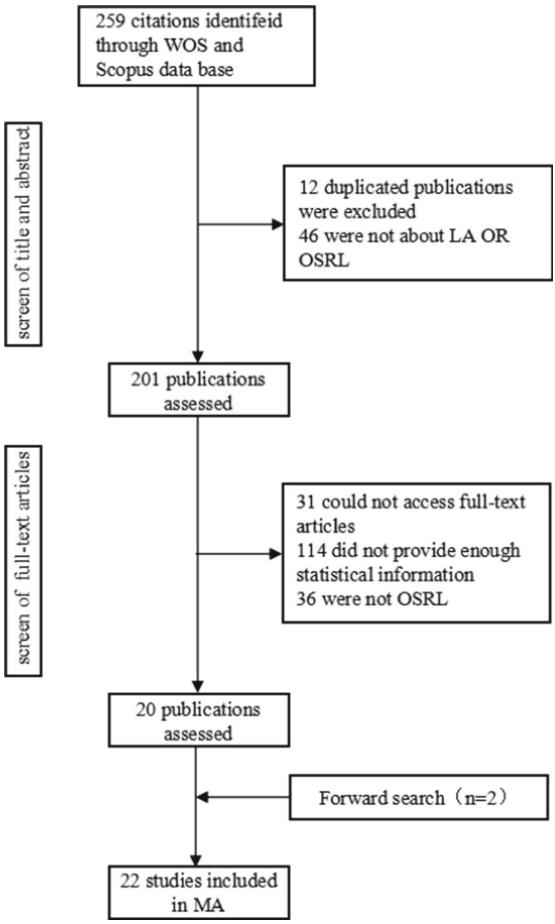

Fig. 3. Flow diagram of studies included in the present study

4.3 Coding Procedures

We coded the studies and computed effect size using CMA 3 (Comprehensive Meta-Analysis version 3). The following basic information were coded from each study (See Table 1): (1) title of the study; (2) publication year; (3) types of learning analytics, including clustering, relationship mining and distillation of data for human judgment; (4) types of learning environment, including blended learning, mobile learning, online learning and technology-supported learning; (5) type of data resources, including questionnaire and log file; (6) educational stage, including K-12, undergraduate and graduate;

(7) sample size, means and standard deviations. All studies were separately coded by 2 people. Some studies did not reach a consensus because different people have different opinions. Then the two people talked with each other and came to an agreement where characteristics of studies were not in consensus.

Table 1. The relationship between learning analytics and online self-regulated learning

Number	Study name	Learning analytics	Learning environment	Data resource	Educational stage	Effect size	Std Err
1	Long, 2013	D	T	Q	K	0.440	0.181
2	Beheshitha, 2015	C	T	L	U	1.299	0.501
3	Tabuenca, 2015	C	M	Q	G	0.397	0.384
4	Yamada, 2015	D	T	Q	U	0.162	0.251
5	Kim, 2016	D	O	Q	U	0.405	0.164
6	Mouri, 2017	R	T	L	U	0.902	0.451
7	Lu, 2017	D	O	Q	U	0.972	0.208
8	Kim, 2018	C	O	L	U	1.297	0.201
9	Silva, 2018	D	B	Q	U	0.719	0.209
10	Chen, 2018	D	M	Q	U	0.360	0.293
11	Klock, 2018	D	T	L	U	0.846	0.247
12	Shimada, 2018	D	B	L	U	−0.223	0.153
13	Zou, 2018	D	T	L	G	1.453	0.266
14	Molenaar, 2019	D	T	Q	K	8.228	0.729
15	Fung, 2019	R	O	L	U	0.580	0.195
16	Gong, 2019	D	B	Q	U	3.197	0.345
17	Molenaar, 2020	D	M	L	K	0.632	0.222
18	Hellings, 2020	D	O	Q	U	0.640	0.055

(*continued*)

Table 1. (*continued*)

Number	Study name	Learning analytics	Learning environment	Data resource	Educational stage	Effect size	Std Err
19	Aguilar, 2021	D	T	Q	U	−0.295	0.107
20	Tlili, 2021	D	B	Q	K	1.917	0.433
21	Bao, 2021	D	O	Q	G	0.173	0.332
22	Zhao, 2021	R	T	L	G	0.866	0.232

Note C = Clustering. R = Relationship mining. D = Distillation of data for human judgment. B = Blended learning. M = Mobile learning. O = Online learning. T = Technology-supported learning.Q = Questionnaire. L = Log file. K = K-12. U = Undergraduate. G = Graduate

4.4 Moderator Analysis

Several characteristics of each study were coded as potential moderators: (1) learning environment (blended learning or mobile learning or online learning or technology-supported learning), (2) data resource (questionnaire or log file), (3) educational stage (K-12 or undergraduate or graduate).

4.5 Data Processing and Analysis

Hedges's g is an intuitive way to reflect the effects of learning analytics on online self-regulated learning (Borenstein et al. 2009). Thus, for each independent sample, r was extracted or computed using the information available in the study. Comprehensive Meta-Analysis software 3 was used to compile the effect size data and conduct analyses.

5 Results

5.1 Test for Publication Bias

In order to ensure the credibility the research, we did the public bias test. The funnel plot and Rosenthal's fail safe-N are the common methods to test whether the public bias exist. According to Sterne (2011), funnel plot is a scatter plot of the effect estimates from individual studies. If these scatter plots are symmetrical and cluster on the upper end of the funnel, then there is no public bias. Also, the fail-safe N demonstrates how many nil-null articles would be needed to change the statistically significances (Carson 1990). As is shown in Fig. 4, a majority of studies cluster on the top of the funnel, which means the public bias could be overlooked. Moreover, Rosenthal's fail-safe N = 1570, suggests there would be nearly 1570 studies added to the analysis that could make the cumulative effect nonsignificant. To conclude, there is no public bias for this study.

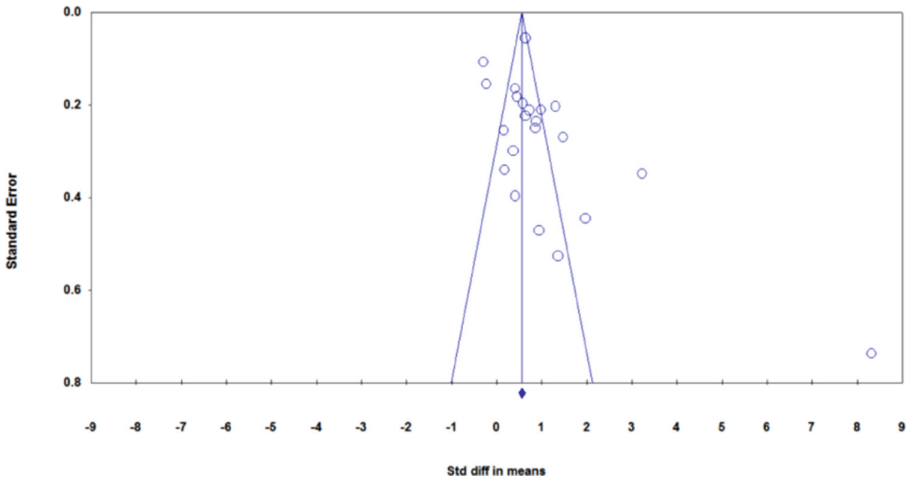

Fig. 4. The funnel plot

5.2 Test for Heterogeneity

Test for heterogeneity is indispensible for meta-analysis which is based on the null hypothesis that all the studies share a common effect size. Results indicated that the true effects were heterogeneity ($Q = 312.599$, $I^2 = 93.281$), providing evidence that random model should be adopted. And under random model, I^2 statistic indicated that 93.281% of the observed variance reflects real differences in effect size. Using these values a 95% percent interval with a lower limit of 0.647 and upper limit of 1.285 was calculated. 95% of all true effect sizes should fall within these limits according to these estimates (Table 2).

Table 2. The test for heterogeneity

Model	Point estimate	Number studies	95% CI		Z-value	Heterogeneity			
			Lower	Upper		df	I^2	Q-value	P-value
Fixed	0.562	22	0.490	0.633	15.377	21	93.281	312.599	0.000
Random	0.966		0.647	1.285	5.931				

5.3 Test for Overall Effect

Based on the test for heterogeneity, the present study adopted random model to do the analysis (see Table 3). The correlation between clustering and online self-regulated learning is 1.030 ($p < 0.001$), indicating that clustering has a significant positive effect on online self-regulated learning. Meanwhile, the correlation among distillation of data for human judgment and relationship mining with online self-regulated learning is 1.008

and 1.726 respectively, showing that both distillation of data for human judgment and relationship mining have a significant positive effect on online self-regulated learning. We found that the effect sizes of relationship mining were relatively larger than clustering and distillation of data for human judgment, suggesting that relationship mining has a larger effect on online self-regulated learning. Compared with clustering and distillation of data for human judgment, not only could relationship mining provide visualization of online learners' learning performance, but also draw the learning path supported by learning logs. For instance, Fung (2019) designed an e-learning journals based on the theory of self-regulated learning, finding that students' self-efficacy in self-reflection significantly increase after the intervention. The e-learning journal could detect the online learners' comprehensive level and provide corresponding suggestions in accordance with personalization, which is very effective for the improvement of online self-regulated learning.

Table 3. The overall effect of meta-analysis

Subgroup within the study	Point estimate	Number studies	P-value	95% CI	
				Lower	Upper
Clustering	1.050***	3	0.000	0.462	1.638
Distillation of data for human judgment	1.008***	16	0.000	0.613	1.402
Relationship mining	1.726***	3	0.000	0.445	1.007

Note random effects model; * $p < .05$; ** $p < .01$; *** $p < .001$..

5.4 Subgroup Analysis

Though overall effects have descriptive value, a large proportion of the variance in observed effects sizes is attributed to factors other than sampling error indicated by I^2 statistic (Kates 2018). It was impossible that the same effect was present under all conditions. Hence, the present study proposed that effect size might be moderated by (1) learning environment, (2) data resources, and (3) educational stage. Table 4 summarizes the results of these analyses.

The subgroup analysis revealed a mean correlation of 1.394 for blended learning, 1.36 for technology-supported learning, 0.703 for online learning and 0.518 for mobile learning, suggesting that learning analytics have a somewhat larger positive influence on technology-supported learning than on mobile and online learning. The between-groups homogeneity statistic (Q) was used to test the group difference. And based on the summary statistics for moderators, Q was not statistically significant at $p < .05$, thereby indicating no significant difference in between-group effects. What accounts for this result? Though different learning environments have different characteristics, online self-regulated learning is the personal ability to direct himself by voluntarily setting learning goals and tracking the learning progress (Harsel 2021). So the outward condition has little to do with online self-regulated learning.

Data resources in effect size were also examined. The mean correlations were 0.829 in questionnaire and 1.095 in log file. Also, statistically significant data source differences were found ($Q = 0.692$, $p < 0.05$). The effect size of log file is larger than that of questionnaire. It could be because online self-regulated learning is a dynamic and ongoing process and different phases of OSRL definitely have different characteristics. While the methods of questionnaire could only collect cross-sectional data, which is not in accordance with online self-regulated learning. Hence the log data exerted more influence on OSRL compared with questionnaire.

Another concern was whether the effect size were moderated by educational stage, there was a statistically significance difference between the correlation coefficients of K-12 ($r = 0.773$), undergraduate ($r = 2.666$) and graduate ($r = 0.731$). The effect size of undergraduate students was two times larger than that of graduate and K-12 students. It could be because the cognitive abilities of K-12 students are still in growth and they need the guidance of the tutors to help make decisions based on the result of learning analytics. For example, Tlili (2021) designed a smart collaborative educational game with learning analytics to support English vocabulary teaching in a public primary school, finding that the students who used the smart game with LA and tutor's guidance performed better in language acquisition. Moreover, the thinking ability of graduate students is close to adults and their curriculum is more difficult than the undergraduate's, so the effect size of them is smaller than undergraduate students and the development of OSRL slows down.

Table 4. Summary statistics for moderators

Moderator	Number studies	Point estimate	95% CI		Z-value	Q-value
			Lower	Upper		
Learning environment						4.988
Blended learning	4	1.394	−0.007	2.794	1.950	
Mobile learning	3	0.518**	0.198	0.838	0.838	
Online learning	6	0.703***	0.454	0.952	0.952	
Technology-supported learning	9	1.36***	0.588	2.131	2.131	
Data resources						0.692*
Questionnaire	9	0.829***	0.046	1.250	3.866	
Log file	13	1.095***	0.630	1.561	4.610	
Educational stage						4.122*
K-12	4	0.773**	0.221	1.326	2.743	
Undergraduate	4	2.666**	0.828	4.505	2.842	
Graduate	14	0.731***	0.392	1.069	4.232	

Note random effects model; * $p < .05$; ** $p < .01$; *** $p < .001$..

6 Discussion

In conclusion, this meta-analysis was designed to explore the extent to which learning analytics influences student online self-regulated learning, and if so, the extent to which the effects of learning analytics are moderated by (1) learning environment, (2) data resources, and (3) educational stage. The conclusions emerging from the present study are as follows: First, overall, learning analytics has a positive effect ($r = 0.966$) on online self-regulated learning. Second, relationship mining has a larger effect on online self-regulated learning compared with clustering and distillation of data for human judgment. Third, the log data is critical method of collecting information in that it has a larger effect on OSRL compared with questionnaire. Fourth, the effect size of undergraduate students was larger than that of K-12 and graduate.

The results from our studies are consistent with the argument that learning analytics exert a positive effect on online self-regulated learning (Beheshitha et al. 2015; Tabuenca et al. 2015; Siadaty et al. 2016). The present study has several strengths. Initially, we divided the learning analytics into clustering, relationship mining and distillation of data for human judgment and compare the effect size of them. Moreover, we employed the data resources as the moderator, which enabled us to better understand the essence of online self-regulated learning. Several limitations to the present study should be noted. Given the high diversity of constructs examined for learning analytics and online self-regulated learning in this study, it was unlikely to find a single summary effect. Also, future research is needed to investigate different phases of online self-regulated learning. In detail, online self regulation includes several phases such as forethought, control, reaction and reflection (Pintrich 2004). The future research may divide the dependent variable (online self-regulated learning) into different phases and examine the difference between learning analytics and them respectively.

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Shaping a Positive Learning Environment

Bridging the Gap Between Digital Divide and Educational Equity by Engaging Parental Digital Citizenship and Literacy at Post-Covid-19 Age in the Hong Kong Context

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Abstract. The COVID-19 pandemic has brought about an unprecedented challenge to global education. It has changed how many of us, especially our children, learn and gain valuable insights into parenting needs concerning online learning, and digital literacy is more important than ever. However, the digital divide and educational equity have been sharpened amidst the ongoing pandemic; people without access to Information and Communications Technologies are even more disadvantaged than before. In Hong Kong, remote learning has increased exponentially since the outbreak in early 2020, and it has been continued under the "new normal"- which students and educators need to manage and integrate technology into their everyday teaching and learning cycle. When it is specifically essential to ensure equal and inclusive access to remote learning for students, parental involvement should arouse more prominent attention. The emerging problem has been shifting from the opportunity of access to technology to digitally illiterate parents. Hence, this paper will discuss the long-lasting issue between the digital divide and education inequality in Hong Kong, and recommend bridging the digital divide should focus more on nurturing parental digital citizenship and literacy so they can appropriately facilitate the co-learning process with their children in this "new normal" era effectively.

Keywords: Digital divide · Educational equity · Parental digital citizenship and literacy · Remote learning · Hong Kong

1 Introduction

The COVID-19 pandemic has given an influential and long-lasting reminder about what is important to our life. All of a sudden, it can be seen on the one hand how close interconnectedness, happiness, and prosperity depend upon others, which is true at all levels. On the other hand, COVID-19 has changed how a lot of us, especially our children, are learning, and gaining valuable insights into parenting needs concerning online learning

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and digital literacy is more important than ever. However, the digital divide and educational equity have been sharpened amidst the ongoing COVID-19 pandemic (Osman and Keevy 2021). With much of society grinding to a halt, many people look to Information and Communications Technologies (ICTs) to adapt to the evolving uncertainty and operate with minimal disruption; unfortunately, the recent experience with COVID-19 shows that the transition to these extraordinary circumstances is far from smooth (Don Rodney 2020). Remarkably, people without access to ICTs are even more disadvantaged than before. While many initiatives worldwide have been made in bridging the digital divide, COVID-19 has brought to the fore how precarious access to ICTs is unfettered and ICTs becoming a challenge to many people. Most essentially, disruptions in the delivery of lessons to students and the shift to online learning have made the digital divide more pronounced. According to UNESCO (UNSECO 2020), around 1.5 billion learners are affected by school closure under the COVID-19 pandemic, and it represents 89.4% of total enrolled learners globally. Unfortunately, a shift to virtual classrooms cannot be accomplished all shortly. It is not a matter of infrastructure, digital literacy in remote learning is another part mostly being neglected for both children and parents instead.

In Hong Kong, the pandemic contributes to the acceleration of technological change. Those without digital access due to poor computing equipment, slow internet speed, or inadequate home environments are left behind. It occurs explicitly in students from disadvantaged families after online learning has been required by the government (Xiao and Fan 2020). Society for Community Organization's (2020) survey with over 700 Hong Kong children participated from grassroots families, around 40 percent of respondents did not have web access at home, and 90 percent failed to afford the technology. Even though the government and many other trusted funds have allocated subsidies to enable low-income families to purchase software and computers, the problem of operation and implantation on online learning is still not fully overcome, resulting in educational equity still existing. In light of this backdrop, this paper will firstly provide the global overview and conceptualization of the digital divide and educational equity and explain the current situation of these matters in the local context. Finally, it argues that in addition to infrastructure equipment, engaging parental involvement is compulsory to bridge the gap of digital inclusion.

2 Brief Conceptualization and Overview of Digital Divide and Educational Equity in the Globe and Hong Kong

2.1 Brief Conceptualization and Overview of the Global Digital Divide and Educational Equity

The digital divide was traditionally defined as the accessibility gap between who can access computers and the internet and those who do not (Van Dijk 2012). OECD (2001: 5) refers digital divide as "the gap between individuals, households, businesses and geographic areas at different socio-economic levels with regard both to their opportunities to access ICTs and to their use of the Internet for a wide variety of activities". Equity is addressed in policy with a qualitative property based on judgments concerning justice rather than a quantitative level of equality (Kelley-Salinas 2000; Sutton 1991; Yuen et al.

2016). Light (2001: 725) suggested that equitable distribution of computers, the internet, and other technologies is essential for education because it will "persist in a recognizable form with continuing value as educational tools both inside and outside the classroom". The adoption of information technology in education requires computer and internet access and information technology literacy, which may create a digital divide between the disadvantaged and the others, and perpetuate social stratification (Angus et al. 2004; Sutton 1991; Tondeur et al. 2010; Volman and van Eck 2001). Studies indicated that inequalities had not been resolved in the ever-growing networked society. Those disadvantaged are not necessarily benefited from their access to information technology as the family-related disadvantages may not be eliminated (Angus et al. 2004; Carveth and Kretchmer 2002; Lau and Yuen 2014). Several factors could affect digital inequalities, such as socio-economic status, income, level of education, ethnicity, gender, age, connectivity, and geography (Bucy and Newhagen 2004; Compaine 2001; Durndell et al. 1995; Volman and van Eck 2001).

The digital divide between the developed and developing countries is significant. Half of the world's population is still without internet access in 2019, with the vast majority concentrated in developing countries. Of the 25 least connected countries globally, 21 are in Africa (The World Bank 2020). However, the pace at which the internet is growing in Sub-Saharan Africa is also one of the fastest in the world. People's identity could influence access to information technology. One billion people cannot prove their identity, limiting their access to digital services and opportunities (The World Bank 2020).

Gender difference is a significant factor contributing to the digital divide in the least developed countries. Women are 33% less likely to use the internet than men. 25% of women are less likely to know how to leverage digital technology for basic purposes such as using a table sheet. South Asia has a gender gap, with women being 51% less likely to use mobile internet than men (The World Bank 2020). Gender-based digital exclusion is affected by the affordability, lack of education and skills and technological literacy, and inherent gender biases and socio-cultural norms (OECD 2018). There are roughly 327 million fewer women than men who have a smartphone and can access mobile internet, while women are on average 26% less likely than men to have a smartphone. These proportions stand at 70% and 34% in South Asia and Africa, respectively (OECD 2018). While the global digital gender divide in internet usage remained almost unchanged between 2013 and 2017 (about 11%), the gap between developed and developing countries increased, the gender internet usage gap increased by 3% in the least developed countries and 4% in Africa (OECD 2018).

2.2 Overview of the Digital Divide and Educational Equity in Hong Kong

The popularity of using the internet provides a significant advantage and convenience to many service sectors, such as finance, banking, education, which could assist Hong Kong to maintain its competitiveness among Asian countries (Legislative Council 2021). However, it also widens the digital divide as users possess specific information technology literacy and devices to access, such as computers and internet connections. Disadvantaged groups generally have fewer opportunities to access the services offered through information technology (Hong Kong Computer Society 2000). With the launching of

the second strategy on information technology in education in 2004, the Education and Manpower Bureau has implemented the "Computer Recycling Scheme' to provide used computers to support the needy students (Education and Manpower Bureau 2004). In 2011, a five-year 'I Learn at home' programme was introduced to help low-income students purchase computers and pay for broadband services to learn through the internet at home. However, Yuen et al.'s (2014) territory-wide survey revealed gender and socioeconomic status still have significant effects on students' home computing, in particular the differences in access and use, learning-related usage, and parenting practices in encouragement. The observation comes up with whether digital inequality remains unchanged while the government has committed a lot to extensively utilize ICT in the local education sector (Lam 2020).

There has been a steady increase in the percentage of households with a personal computer at home in the past two decades, with 49.7% in 2000, 70.1% in 2005, 77.9% in 2010, 80.4% in 2015, respectively (Census and Statistics Department 2020). The percentage of households with a personal computer connected to the internet also became popular in Hong Kong, which accounted for 36.4% of households in 2000, 64.6% households in 2005, 76.4% households in 2010, and 79% households in 2015, respectively (Census and Statistics Department 2020). However, there was a slight decrease in personal computer ownership at home (77.6%) and its connection to the internet (77.6%) in 2019 (Census and Statistics Department 2020). Instead, households used other modes, such as a smartphone for internet connection. 94.1% of households can access to the internet by any devices at home (Census and Statistics Department 2020).

The monthly household income seemed to have close relationship with the ownership of personal computers at home. People with lower monthly income, such as below $10, 000 tend to have a lower percentage of computers at home (15.3% in 2000, 40.9% in 2010, and 33.9% in 2019). On the other hand, the high-income group, those who have a monthly income of $50 000 or more, generally have a high percentage of personal computer ownership, with 82.8% of households in 2000, 98.8% of households in 2010, and 96.5% in 2019, respectively (Census and Statistics Department 2000. 2011 and 2020). Similar to computer ownership, household income level affects the internet connection of computers at home. The internet connection rate grew with household income. There is 7.7%, 38.3%, and 33.8% of households with a monthly household income of less than $10, 000 had an internet connection of computers at home in 2000, 2010, and 2019, respectively, whereas 71.5%, 98.2%, and 96.5% of households with a monthly income of $50, 000 and more had computer internet connection in 2000, 2010 and 2019 respectively (Census and Statistics Department 2000, 2011 and 2020).

Besides, knowledge of computers could affect the digital divide and educational equity, there is a steady growth of computer knowledge of people in Hong Kong. From 2001 to 2019, the rate of persons aged ten and over having knowledge of using PC increased, from 51.9% to 88.3% (Census and Statistics Department 2020). Young people tended to have more knowledge of using the computer. In 2019, persons aged 10–14 had the highest knowledge rate of using PC (100.0%). This figure was closely followed by persons aged 15–24 and 25–34 (99.9%) and those aged 35–44 (99.3%). Elderly persons seemed to have less computer knowledge, with 89.8% for 55–64 and 52.2% for those aged 65 and over (Census and Statistics Department 2020).

Gender difference of understanding computer knowledge is not prominent between aged 10 to 44 (ranging from 99.3% to female of 100%). For persons aged 45 and over, the rate of knowing using PC was higher for males (ranging from 59.3% to 98.5%) than their female counterparts (ranging from 45.9% to 97.1%) (Census and Statistics Department 2020). Apart from gender factors, educational attainment could influence one's computer knowledge. In 2019, persons aged ten and over with lower educational attainment (primary education or below) generally had less knowledge of using PC (12.2%). People who attained relatively higher education tended to know using computers, with 55.3% having gained secondary education and 32.6% having achieved post-secondary education, respectively (Census and Statistics Department 2020).

In view of economic activity status, students had the highest knowledge rate using the computer (100.0%). This figure was followed by economically active persons (97.2%). Home-makers and retired persons had relatively lower rates of having knowledge of using the computer, with 87.8% and 57.1% respectively. (Census and Statistics Department 2020). The economic prosperity brought about internet use becoming more and more popular in the past two decades, the rate often and over persons who had used the internet increased, from 30.3% to 91.7%, between 2000 and 2019 (Census and Statistics Department 2020). For internet connection in 2019, 99.3% had used a smartphone, 73.5% had used desktop computer, 51.6% had used tablet, 48.1% had used laptop, and 30.2% had used other devices, respectively (Census and Statistics Department 2020). Young people (aged 10 to 54) tended to use more internet (ranging from 99.3% to 100%) than elderly persons, 95.9% of persons aged 55–64, and 62.2% of those aged 65 and over (Census and Statistics Department 2020). There is no significant gender difference of aged 10 to 54 of using the internet. Students had the highest internet use rate (100%) (Census and Statistics Department 2020). In view of smartphone penetration, there is a growing trend of smartphone penetration in Hong Kong from 2012 to 2019. People aged ten and over had smartphones from 54% to 91.5% (Census and Statistics Department 2020). In 2019, the economically active persons (99.1%) had the highest rate of a smartphone than the retired persons 68.9(%). A high rate of smartphone penetration was observed among home-makers and students, with 94% and 92.3%, respectively (Census and Statistics Department 2020).

3 The Current Situation of Digital Divide and Educational Equity at Post Pandemic Age in Hong Kong

The outbreak of COVID-19 and the resultant need to maintain social distancing have led to extended class suspensions for schooling in Hong Kong in the first half of 2020, the first of 2021, and the first of 2022. During these periods, many schools have begun delivering lessons through e-learning. In view of this critical moment, the Hong Kong government has assisted schools in implementing e-learning through various funding and resource support (Education Bureau, 2020a). An extra One-off Information Technology Grant of around HK$200,000 has been disbursed in phases to support eligible public sector schools to enhance their practice of e-learning since 2017. For example, the Hong Kong Education City, a wholly-owned company of the government established in 2000, has assisted the education community proactively to promote quality education

and information technology for lifelong and life-wide learning. It provides information, resources, interactive communities, online tools, and services to strive for innovative learning and enhancement for teaching effectiveness. Notwithstanding the government's existing provisions for digital access, there are concerns that students from low-income families may suffer from the digital divide and weaken the disadvantaged families in e-learning, predominantly during the COVID-19 epidemic (Lam 2020).

3.1 Inadequate Access Opportunity Deteriorating Digital Divide and Educational Equity

The HKSAR government has launched three Information Technology in education (ITE) strategies promotion initiatives since the 1998/99 school year for the successful integration of the elements of in ITE, and a total of $14 billion has been invested for enhancing the learning and teaching with the aid of IT and e-learning resources after the start of the implementation of the Fourth Strategy on IT in Education (ITE4) in 2014 (Education Bureau 2015). Additional resources, including teaching resources, teacher training, and on-site support, further facilitate the schools to develop their school-based strategies and enhance the professional capacities of their teachers for meeting the needs on evolving the traditional education into ITE, and remarkable achievements have been observed. Surprisingly, the initial findings were reflected an opposite phenomenon in the study reviewing the digital citizenship development among Hong Kong students (Reichert et al. 2020). "Digital divide" was reported as around 30% of the participated students (including Primary 3 (P3), Secondary 1 (S1), and Secondary 3 (S3) students) reported that they did not have access to a desktop computer, laptop/portable computer or tablet at home respectively and the percentages of no access to these digital devices with large displays at home ranged from 8% (S3 students) to 13% (P3 students). In addition, significant portions of the participated students shared the devices with others, with percentages ranging from 35% (P3 students) to 46% (S1 students). Compared to the situations in the USA, the portion of possessing such digital devices was revealed to be higher among Hong Kong families as 18% of the participated USA families with 6- to 13-year olds children reported they did not have desktop and laptop computers. In addition, this percentage further reached 31% for those families below the poverty level (Rideout and Katz 2016). It is expected that the limited access opportunity on digital devices driven by the wealth inequality might be more severe as Gini coefficients of Hong Kong were higher than those of the USA in the past years (Hong Kong Economy, n.d.; Sheng and Geng 2019; Statista 2020; OECD 2020). On the other hand, the smartphone was the significant digital device possessed by the participated students (Reichert et al. 2020). More than 95% of the participating secondary students have access to a smartphone, and most of them had their smartphones. Similarly, this percentage is still superior to that reported in the study conducted in the USA (80%) (Rideout and Katz 2016). Though there is no strict definition that the smartphone is not an appropriate device for online learning, it is understandable that it is more for leisure activities and communication, in light of a higher prevalence of digital devices among Hong Kong families when compared to USA families, there was still room for enhancing the "infrastructure" of ITE.

Although the future needs on digital devices for online teaching and learning could be met within coming years under the policy plans of the government, the accidental

outbreak of COVID-19 further boosted such needs within a short time as the schools in Hong Kong adopted an online teaching approach according to the guidance from the Education Bureau. With the use of free online video conferencing software and the support of cloud technology, "online classrooms" were expected to be a perfect solution for achieving "Suspending Classes without Suspending Learning" under the situation that face-to-face teaching was no longer an option (Yeung 2020). Yet, the effectiveness of the supporting measures to e-learning from government reserved a questionable remark for long (Kong et al. 2017; Lau and Lee 2021). The existing problem is mainly tied with "Bring Your Own Device" (BYOD) policy, highlighting schools should have devised teaching strategies in using the ICTs device, formulate a strategy to govern students in using the mobile computer devices in school and advise parents to assist students to conduct e-learning through formal channels (Education Bureau, 2020b). Even students are encouraged to bring their own ICT devices to school for learning activities, but for disadvantaged students who are suffering digital divide, they might not be able to benefit from e-learning experiences and BYOD initiative (Lam 2020). The study evaluating the implementation of online teaching under the outbreak period found that around 50% of the participated teachers commented that the effect of these policies failed to reach the expected outcomes and more than 80% of them further commended the support from the government was insufficient (Oriental Daily, 2020). The major causes of the partial failure of the measures included no or limited access on digital devices, digital devices without appropriate configuration for online learning, restricted or no wifi connection for access to the internet, and insufficient parental support on using the software for online learning. Although additional measures, for example, providing extra subsidies for grassroots students, have been adopted by the government, the coverage of the benefit brought was still limited (Fung 2020).

3.2 Digitally Illiterate Disadvantaged Parents Undermining Their Supporting Role on Remote Learning

Another alerting result from the local study on students' digital citizenship development was that only around 50% of the participated students received parental support in various aspects of Internet use (Reichert et al. 2020). On the contrary, the percentage of parents helping children with their usages of digital devices was observed to be higher in the USA (77%), and the major types of parental support included "finding information online (84%)", "learning how the computer or mobile device works (78%)" and "fixing things that go wrong (70%)" (Rideout and Katz 2016). Further, considering the heavy usage of digital devices for doing school assignments, leisure activities, and communicating with others, parental guidance is relatively insufficient (Pokhrel and Chhetri 2021). In addition, when the students are transited from their primary school study to secondary school study, a noticeable shifting on the people's help seeking when they encountered something unpleasant on the internet – from adults or family members to friends or peers. Some senior students reported that they could not remember that they received help from their parents or did not need much help from their parents. Although the results are alarming, it is understandable as the parents in Hong Kong faced massive pressure from their works and 80% of the parents who participated in another study found it was difficult for them to get along with their children without being bothered,

around 50% of them even failed to have active interaction with their children (Oriental Daily 2020). Hence, this could be one of the possible explanations for not seeking parental support when the children had an unpleasant experience on the internet. In addition, some disadvantaged parents, especially those with low educational attainment and socio-economic status, may not possess sufficient IT knowledge for providing such kind of support to their children even if they want (OECD 2012).

The subsequent negative influence caused by this "IT knowledge insufficiency" has been further magnified due to the outbreak of COVID-19 as the teaching mode is shifted from face-to-face to online. News reflected that the parents' pressure under the pandemic increased as they became the only resource for overcoming technical problems related to online teaching. In a study conducted by the Hong Kong Federation of Youth Groups (2020), one of the interviewed parents showed concern about the increment of computer and internet uses of their 13-year-old son, but they failed to guide as they were not familiar with that software for online teaching. They became more anxious about this situation as their "work from home" arrangement had just been ended. It is one of the significant challenges faced by these disadvantaged parents.

It has been well documented that parental involvement played a critical role in the success of their children's education, and the forms of parental involvement are diverse, ranging from good parenting in the home to participation in school events or even in school governance (Choha and Khan 2010; Desforges and Abouchaar 2003). The outbreak of COVID-19 strengthens additional barriers on hindering the parental involvement in their children s education, and the restrictions related to hardware, including access to digital devices and provision of a good learning environment at home, showed colossal influence on the children's learning progress. UNICEF further indicated that the reading skills of younger children could be heavily influenced without access to literacy materials at home during the outbreak period, and the family income was observed as a key factor influencing on home literacy environment (Brossard et al. 2020). The barriers introduced were not purely related to the restriction on hardware. As online learning has been widely adopted during the lockdown of the pandemic, the parents were forced to partially take up the role of a teacher. It not just increased the demand for parental support, but also especially for those parents who do not possess the corresponding subject knowledge or even with low educational attainment, and they might not be the "right person" for taking up this role (Azubuike and Aina 2020). Moreover, it was observed that the caregivers with low educational attainment tend to provide less help on the homework of their children, which meanwhile showed a negative influence on the reading skills and foundational numeracy skills of their children (Brossard et al. 2020). Therefore, Chinese parents showed less preference for online learning as they considered their children as non-self-regulated learners, guidance and accompaniment from seniors are needed for motivating the study of their children. When the parents did not have sufficient time for providing parental support on their children's online learning at home, traditional face-to-face teaching was hoped to be resumed as soon as possible. This negative attitude towards online teaching further undermined their expected supporting roles (Dong et al. 2020).

3.3 Immature Development of Digital Citizenship Education in Terms of Current Local Education Context

The norms of appropriate, responsible behaviour about technology use are prominent (Ribbie 2015). The definition of "Digital citizenship" is further expanded by the United Nations Educational, Scientific and Cultural Organization (2016: 15), maximizing "the ability to find, access, use and create information effectively; engaging with other uses and with content in an active, critical, sensitive and ethical manner; and navigating the online and ICT environment safely and responsibly, while being aware of one's rights." Under the context of education, the student's ability to use IT safely, responsibly, and ethically should be focally enhanced as one of the aims of integrating digital citizenship into the current school curriculum. Some of the key findings of this policy review included that (1) the 22 Member States participated in this policy review had policies promoting ICT literacy skills among children and basic infrastructure such as setting up one computer lab per each secondary school has been provided; (2) measures for improving the teachers' skills on teaching ICT should be further improved; (3) development of cyber safety or privacy policies, especially under the school environment, should be enhanced and school ICT security systems were vulnerable and (4) there were no well-established systems for monitoring and evaluating digital citizenship policies and procedures in most of the participated Member States (UNESCO 2016).

In the same policy review, the ICT Development Index (IDI) of Hong Kong was observed as the second-highest one among the 22 participated Member States in the Asia-Pacific regions, which was honored to be higher than the average IDI among the developed countries and the entire world (UNESCO 2016). Hence, it is expected that the concept of digital citizenship has been introduced to students under the implementation of Strategies on IT Education in Hong Kong. In the same local study mentioned previously, digital literacy (as one of the critical elements of digital citizenship development) among secondary students, with a moderate extent of correlation on students' collaborative problem-solving skills, was shown to be higher than primary students, but significant deviations on digital literacy were indicated among students from different schools (Reichert et al. 2020). The study also pointed out study forms and gender of the students, socio-economic status of the students' families, and the districts of the schools showed a different extent of influence on their digital literacy. In spite of these, significant portions of participating students had been engaged in risky online communication activities, including looking for new friends on the internet and pretending to be older than their actual ages on the internet to access particular websites. The percentages increased significantly from P3 students to S3 students, and the portions of looking for new friends on the internet and pretending to be older than their actual ages on the internet to access particular websites reached 54% and 40%, respectively (Reichert et al. 2020). It was expected due to school policies' influence on developing students' digital literacy, teachers would be required to attend professional training to implement curriculum and pedagogical changes in teaching digital citizenship and deliver the key concepts which is critical on digital citizenship (Chong and Pao 2021).

Given that parental support might be insufficient for their children, schools become the only place for building digital citizenship. As reported in the same study, 17% of the participated teachers have not discussed any cyber wellness topics with their students

(Reichert et al. 2020). In comparison, the most common issues included "the safe and responsible use of the Internet (68%)", "maintaining a healthy balance between online and offline activities (67%)," and "the ethical use of content created or owned by others (67%)". Only half of the participated teachers (51%) would discuss with their students the topics related to cyber security issues, legal consequences of the inappropriate use of ICT (51%), and appropriate responses to cyberbullying (51%). Additionally, 68% of primary and 54% of secondary teachers who participated in the study reported that they did not know whether a cyberbullying policy existed in their schools (Reichert et al. 2020). Understandably, digital citizenship education should be closely linked to the concept of digital citizenship, and according to the ten domains for setting digital citizenship education proposed by the Council of Europe (2018), the situation in Hong Kong reached an acceptable level under the domain of "Access and inclusion." However, it may be underestimated, especially under the challenge of the outbreak of COVID-19. For the domains of "Learning and Creativity" and "Media and Information Literacy," there was still room for further improvement in order to enhance the "competencies of personal and professional development" and "the ability to interpret, understand and express creativity through digital media, with critical thinking" among the students at their school ages. Thus, Reichert et al. (2020) concluded that the teachers should further enhance the awareness and understandings of the online rights of the students to align with the following four domains, namely: "Active Participation," "Rights and Responsibilities," "Privacy and Security" and "Consumer Awareness." The Council of Europe (2018) also agrees that maintaining an online presence and identity and positive online interactions should be introduced to the students. In other words, there were still several critical steps for further fostering the development of digital citizenship among Hong Kong students in order to meet the global standards.

4 Discussion and Implication

Managing rapid technological change is a definite global challenge after this pandemic age. Even though the internet is a powerful and essential global public good that requires the highest possible level of everyone's involvement, the fundamental pillars of cooperation are lacking (United Nations, 2020). In the pandemic, digital technology is central to almost every aspect of the response to the pandemic, in particular in remote learning modes, but the digital divide has been intensified, with lower-income parents expressing greater concern worldwide (Horowitz 2020). This scenario also comes across to Hong Kong; while she keeps emphasizing providing sufficient infrastructure provision, alternative assistances are still not effective enough. Therefore, parental digital citizenship and literacy are recommended to bridge the digital divide and educational equity in the local context.

4.1 Engaging Parental Digital Citizenship in Remote Learning

Existing school practice always focuses on cultivating good citizens on the next generation. Digital citizenship is just another fold in the delicate fabric of childhood development, but digital citizenship needs particular attention today because of the divide

between the analog (offline) and digital (online) life of children and the engagements of parents. The sheer time factor of children's online lives is concern enough. The nature of digital devices matters to parents to involve too. To this end, schools must include parents in teaching digital citizenship from the onset to support and authentically experience the e-learning journey. They can guide parents in responsibly overseeing their children's digital lives at home and building a collective vision of a digital citizen. If the education about one's digital life happens only at school, many parents may unsuccessfully get empowered to guide their children's digital behavior, remarkably when it comes to school-owned devices or homework online. It is understood that alignment between school and home with regard to digital citizenship and healthy digital usage is a hallmark of a 21st-century school (OECD 2016; Hiefield 2020). Without parental engagements, digital citizenship will only become an abstract identity in the minds of our students. Importantly, digital citizenship education is related to being a good citizen and exercising good judgment on internet behaviours; engaging parental digital citizenship becomes one of the ways to bridge the digital divide.

Digital citizenship is aimed to empower every citizen to make smart, responsible, and respectful decisions when using media, and this should apply to parents but not only for students, especially in remote learning (Orth and Chen 2013). When disadvantaged parents may more likely occur limited digital access at home, the gap of digital life between advantaged families and underprivileged families must be unavoidably enlarged. According to the newest whitepaper, the digital divide can be classified into four dimensions (Learning.com 2020). First of all, access and connectivity signify that computing devices and internet connectivity in schools have greatly accelerated, yet the permeation of technology into the learning experience worsens the access and connectivity divide outside the classroom. It results in the intensification of the remote learning effectiveness of marginalized groups of students. When numerous disadvantaged families are competing for connectivity time that perhaps includes limited data, a student's ability to fulfill school assignments might be challenging at best. Finding out the extent of the digital divide of the specific family is a stepping stone, and it means being intentional and transparent in asking questions to students and families.

In addition, digital readiness indicates the skillset that enables people to use technology as informed digital citizens, capable workers, and empowered learners. There must be things that most of the policymakers need to know about how using technology can help our poor young generations and understand how the digital divide impacts their daily learning experiences in this critical age. There is a common understanding that managing the digital divide can create a healthy digital life. The next divide, digital use is most influential to students' remote learning because it signifies the concerns about technology integration in student learning. Normally, higher socio-economic status students can enjoy more creative and playful mediums while middle- and lower-income students are only struggling with the digital use of basic level. This type of digital divide shows that the equity problem of education raises out more other education issues. The last dimension of the digital divide about representation refers to the learning content, technology industry, and computer science workforce. Diversity and representation are necessary by nurturing a sense of belonging, connecting to the learning, and empowering

to pursue advanced academics and employment in light of equal perspective (UNESCO 2015).

In a digitized world, the digital divide will not be genuinely closed until the gap between social and digital inequality and digital access can be bridged. As more students gain access to technology and engage in online learning, it is essential that they are exposed to content that promotes inclusivity, showcases representation, and is accessible to all students. In sum, digital equity is complex, multi-faceted, complicated and dense. Digital equity does not necessarily mean it can be achieved by framing it as a divide, and it will not end with inclusivity either (Passey et al. 2018). Social and emotional learning, assessment modes and methods, platform accessibility, and a host of other ranges also arise (Brito 2020). While digital divide consists of complex factors shaping technology use in ways that serve to exacerbate existing education inequalities, engaging parental citizenship might help further narrow the digital divide alternatively.

4.2 Advocating Parental Digital Literacy Through Home-School Cooperation

Significantly, parental engagement is proven all-around necessary for education transformation in post-COVID-19 education settings. Not only because the primary role of parents as educators has the most considerable impact on learning outcomes regardless of the level of education of parents, but engagement in the digital citizenship transformation with low or very high socio-economic status might have different impacts (Rideout and Katz 2016). Richardson and Samara (2020) stated that active digital citizenship is urgently required in this current critical moment, namely "online", "rights online" as well as "wellbeing online". In the online domain, parental engagement in school activities is crucial for the school to understand their students' daily living realities. It also provides an excellent opportunity for mutual and partnership-based learning.

In order to protect everyone rights online, we see an absolute necessity for tackling online and offline as a continuum. We need to have clear and open communication about all rights, responsibilities, and duties regardless of their online or offline activities and different stakeholder groups. At the same time, teachers still need much support to understand their role as co-educators and co-learners and consider the empowerment of parents as a peer support activity. Regarding wellbeing online, it is essential for teachers and parents to support children in their cyber wellbeing, so increasing attention should be paid to digital literacy for both of them, especially for parents who are the first supporting tier on remote learning. Romero (2014) suggests digital literacy of parents based on four sets of skills, there are (1) privacy, content, and technology management; (2) communication and socio-emotional skills: (3) creative and problem-solving skills; (4) life-long learning to keep abreast of digital literacy skills. Digital literacy in this sense means the ability to use technology proficiently, interpret and understand digital content and assess its credibility, as well as create, research, and communicate with appropriate tools. It further indicates applying necessary technical skills to use and access the internet and equipping the capacity to critically and confidently engage with the online environment (The Government of HKSAR, 2018). Digital literacy skills are crucial for children and parents to have meaningful access to the internet, enjoying equal access to learning for safeguarding children's rights in a digital world to encompass the learning necessary to completely exercise their rights online. In this connection, digital

literacy programmes are a compulsory element of media education and involving basic learning tools and a curriculum in critical thinking and creativity. It also facilitates digital citizenship involves educational tools and a primary curriculum for kids, parents, and teachers to learn three aspects of digital literacy (Koltay 2011):

Technical literacy: Understanding computers and having the technical skills to use them.

Media literacy: Understanding the difference between different media platforms and how it can judge what sources of information online are reliable.

Social literacy: Understanding how people behave online and what you expect of others.

In this respect, the Hong Kong government has launched another initiative apart from those described above to attempt changes. The Task Force on Home-school Co-operation and Parent Education (Task Force) was launched in 2017 to review the existing approach in promoting parent education and home-school cooperation so as to provide recommendations and measures for fostering home-school cooperation and promoting parent education. The Task Force recommended that e-learning courses should be provided for various backgrounds of parents to engage in self-study mode on mobile phones or computers, depending on their study pace and schedule. Parent-child activities, talks, and sharing sessions for e-learning courses are also necessary (Task Force on Home-School Co-operation and Parent Education 2019). Because of the current pandemic scenarios and their impacts, such courses should be extended to including digital citizenship for parental engagement in remote learning to enhance digital literacy for parents. It is recognized that digital literacy can educate disadvantaged parents to become more informed on knowing and enforcing limits. Parental overindulgence in technology can raise a different set of learning difficulties without sufficient knowledge. With the increasing use of technology and gadgets by disadvantaged parents themselves, this improved connection of digitization can substantially affect the development of the children from education.

The one-stop website "Smart Parent Net" created by the Education Bureau is designed to enable every parent to quickly access helpful information to master the knowledge and skills to nurture their children. Practical skills on assisting remote learning should be further provided in this platform to facilitate parental digital literacy, as a starting point of self-study of parents apart so it could become a more popular parent education learning platform (The Hong Kong Government of HKSAR Government 2018). When parents can foster digital literacy, they may well understand technology guidelines at school and in the classroom. It helps them familiarize themselves with the types of technology being used in their children's classrooms and obtain the tools to follow up and complement classroom education with their children. Once parents know everything about technological advancement, parents can become a crucial partner in ensuring children to have equal access and enjoy a reflective learning journey in remote learning. As a home-school cooperation and partnership, parents can reinforce the media literacy educational messages at home for helping children become intelligent cyber citizens and learners (Kong 2018). The parent modeling, which uses the 'co-using approach' also known as co-playing, in educating the child, can be acknowledged as enhancing the parent-child relationship from home-school cooperation to bridge the digital divide in a more effective way (Benedetto and Ingrassia 2020).

5 Concluding Remarks

In this special age of pandemics, it is understandable that being technology-literate is facilitative for remote learning. The engagement should not only rely heavily on teachers; parents should also not be out of the equation on promoting digital literacy in a strategic and nuanced approach to bridge the digital divide. Digital life in this post-COVID 19 age demonstrated our children might be necessary to inhabit 24/7 – online, on cell phones and mobile devices, and anywhere media is displayed. To survive and thrive, today's students must be digitally literate. Nevertheless, it should be noted that educating and empowering parents about digital literacy and cultivating their technology citizenship is vital to their children's learning behaviours to overcome education equity. When media literacy education is called to be integrated into the education system in Education 2030 agenda, parental engagement on digital literacy and digital citizenship education are recommended for future development. According to Frau-Meigs et al. (2017), digital citizenship education is defined as situating global citizenship in an educational context, describing the knowledge, skills, values, and attitudes fostered through teaching and learning about global citizenship. In this sense, teaching and learning opportunities for digital citizenship should occur in formal, informal, and non-formal contexts. An appropriate educational framework is necessary for effective learning opportunities at any level, as well as for teachers' training and parents' education (Stichting International Parents Alliance, 2020).

In the last two decades, the Hong Kong government provided a lot of funding and resource support for schools to promote e-learning, yet the core problem belongs to the digital access and literacy of low-income families. Not only did students from these families suffer from the digital divide, but parents also got affected amid in the pandemic. Hence, nurturing digital citizenship and literacy to low-income parents should be in top policy-making priority to quickly assist their children in remote learning effectively. When Hong Kong home-school cooperation emphasizes encouraging individual schools to effectively develop their collective efficacy in educating children with holistic planning (Pang 2011), parental engagement becomes an important factor in bridging the gap between the digital divide and education equity (Yuen et al. 2018). Under the post-new-normal age, children are facing higher uncertainties on schooling than before. They might need to seek assistance from parents to adapt to the changing learning environments, and parents are obliged to understand how to help facilitate their children learning. Therefore, we should also be aware of the children's well-being given that the digital divide might be continuously sharpened, and future research should be explored how the digital divide would impact the well-being of children and parents because they are constrained to get used to in "new-normal" reluctantly.

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Education Transformation for Hong Kong Cross-Boundary Students During the Pandemic and Beyond: A Planned Behaviour Perspective

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Abstract. This paper focuses on the education transformation adopted by Hong Kong schools to support cross-boundary students (CBSs) during the pandemic and beyond. Ajzen's theory of planned behaviour is used as a theoretical framework to explore teachers' perspectives on the factors influencing their intentions and behaviour related to teaching CBSs online. The findings enrich our understanding of the attitudes and beliefs of school principals and teachers about the importance and necessity of education transformation as a result of the pandemic. Their rationales for the shift from traditional in-person teaching to online and/or dual mode teaching are identified. From a policymaking perspective, the findings provide insights and evidence for government authorities, school management, students, parents and other stakeholders to address the real concerns and needs of schools with CBSs through timely and informed policy decisions.

Keywords: Education transformation · Cross-boundary students · Theory of planned behaviour · Pandemic · Hong Kong

1 Introduction

The term 'Hong Kong–Shenzhen cross-boundary students (CBSs)' refers to students born and studying in Hong Kong while living in mainland China. According to government statistics, there were 27,000 cross-boundary students in the 2020/2021 academic year (LegCo on Education 2021). They are sometimes dubbed 'little Hong Kong drifters' generally because one or even both of their parents is/are from the mainland. They generally study at secondary schools, primary schools and kindergartens in Yuen Long, Tuen Mun, Tai Po and most of Hong Kong's North District. Before the Covid-19 pandemic, they commuted daily to Hong Kong primarily through one of five land boundary control points between Hong Kong and Shenzhen: Lo Wu, Sha Tau Kok, Lok Ma Chau, Man Kam To and Shenzhen Bay.

At the time of writing, the authorities in both Hong Kong and the mainland had immigration quarantine measures in place due to the Covid-19 pandemic, preventing students from the mainland from attending schools in Hong Kong as they used to do.

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According to a 2020 survey by the Education Bureau (EDB) of the Hong Kong Special Administrative Region (HKSAR), 26,971 CBSs at 825 schools who used to commute to Hong Kong on school days have had to remain on the mainland since the beginning of the 2020/21 school year in response to the pandemic situation and the related prevention and control measures in the two regions. These students have continued to learn at home via various e-learning modes (LegCo on Education 2021). Only a small number of CBSs have been staying temporarily with relatives or friends in Hong Kong to attend face-to-face school classes.

In response to this situation, schools with CBSs have tried all possible means to use different learning and teaching modes and formulated long-term education transformation plans and strategies to cope with the challenges faced during the epidemic and beyond.

2 Theoretical Framework and Research Questions

A thorough literature review yielded a dozen studies on Hong Kong–Shenzhen CBSs. Many of these studies focused on the identity and demographic characteristics of the CBSs (Chan and Ngan 2018; Chee 2017; Xu 2015; Gu and Tong 2012). Others attempted to explain the relevant public services, including immigration, border control, transportation and education sectors (Waters and Leung 2019.a; Chan et al. 2017; Yuen 2011). Further studies examined the regional integration and human geography in education (Waters and Leung 2021; Kang and Jiang 2019; Chan 2018). So far, however, no study has been made of the impact of the pandemic on CBSs. Only one study entitled *Making ways for better education: Placing the Shenzhen–Hong Kong mobility industry* considered the implications of the recent political challenges and the Covid-19 pandemic for this cross-boundary education mobility system (Leung et al. 2021).

This paper addresses the education transformation strategies adopted by schools with CBSs in response to the challenges of the pandemic. It explores the factors influencing online teaching practices based on the framework of the theory of planned behaviour.

2.1 The Theory of Planned Behaviour

The theory of planned behaviour (TPB), proposed by Ajzen (1985, 1991), aims to predict people's intentions to engage in a behaviour at a specific time and place by linking their attitudes and behaviour. Its main claim is that behavioural intentions are influenced by attitudes towards both the likelihood that the behaviour will have the intended outcome and the subjective evaluation of the risks and benefits of that outcome (Davidson and Vidgen 2017).

The TPB posits that human behaviour is planned and determined by a set of factors linked to the individual's perceptions and motivations. Specifically, behaviour is influenced by intentions that are determined by three factors, which we define and illustrate here in relation to the theme of this paper:

Attitudes: how favourably school principals and teachers evaluate the education transformation plans or strategies.

Subjective norms: beliefs about whether people that are important to them, such as the CBSs and their parents, approve or disapprove of the transformation strategies.

Perceived behavioural control: school managements' and teachers' perceptions of the ease or difficulty of implementing the planned strategies. Broadly speaking, this refers to the situational or environmental factors that support or hinder the behaviour (Montano and Kasprzyk 2015). Perceived behavioural control refers to *self-efficacy* (Jeffrey and Pamela 2004), which is individuals' level of confidence that they are capable of performing the behaviour in the face of challenges and/or obstacles (Bandura 1977). In this study, self-efficacy refers to the confidence of school staff in their ability to overcome obstacles or challenges related to implementing the education transformation.

The above three factors together shape people's behavioural intentions, in this case the motivational factors that influence education transformation. In turn, behavioural intention is the most proximal determinant of human social behaviour. The stronger the intention, the more likely it is that the education transformation will be implemented.

Figure 1 illustrates the relationships among the major components of the TPB, which serves as the theoretical framework for this study.

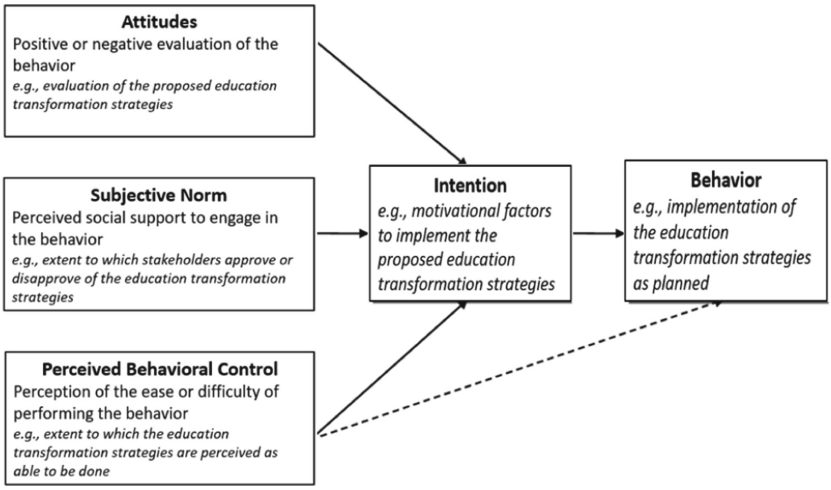

Fig. 1. TPB as the framework for this study

2.2 Research Questions

Based on the TPB, the following research questions were developed to explore attitudes towards behaviour, subjective norms and perceived behavioural control:

1. What is your attitude towards the difficulties or challenges your schools encountered due to the sudden outbreak of the pandemic? *(Attitudes)*
2. What measures or strategies have your schools taken to sustain the school learning of their students stuck on the mainland? How effective do the teachers, students and parents perceive these measures to be? *(Attitudes and subjective norms)*

3. Will such measures still be in use in the post-pandemic era? Are you confident about conducting online/mixed mode teaching as the new normal? *(Self-efficacy)*
4. What kinds of assistance do you expect the government, parents, or other stakeholders will offer to support you? *(Perceived behavioural control)*

A flexible interview protocol was developed by the research team after reviewing the literature relevant to TPB. Follow-up questions, probes, prompts and comments were suggested in the interview guide to enable expansion and clarification of the responses during the onsite interviews.

3 Research Method

The study used in-depth interviews as the research method to seek answers to the research questions. Interviews were conducted with 15 staff members from five Hong Kong schools with CBSs (nine staff members from three secondary schools and six staff members from two primary schools) from 16 to 29 December 2021.

The interviewees were all full-time staff members. Four were senior personnel (principals and vice principals), five were key learning coordinators and panel heads and the other six were teachers of the CBSs. All were interviewed in person on their campus by the second and third authors of the study.

The data gathered from these in-depth interviews were transcribed verbatim into written form, interpreted and coded by the second, third and fourth authors based on the thematic analysis approach of Braun and Clarke (2006). Coding difficulties were discussed with the first author to reach a consensus. The results and emergent themes were grouped into predefined sets, each relating to an element of the TPB.

4 Research Findings

Semantic analysis of the data from the interviews yielded the following findings.

4.1 Education Transformation Strategies During the Pandemic

Before the outbreak of the pandemic, traditional face-to-face classroom teaching was the major or only lecture format at the schools attended by CBSs. During the pandemic when CBSs could not cross the border daily to attend classes, schools were required to carry out education transformation by flexibly using different learning and teaching modes to support continuous learning at home, thus 'suspending classes without suspending learning'. From our interviews, we found that the following education transformation strategies were commonly used by schools with CBSs in response to the pandemic.

Constructing e-Learning Platforms

The first strategy was to construct e-learning platforms that could be easily accessed by CBSs. The most commonly used platforms included Microsoft Teams, Rainbow One, EClass, Zoom, Seesaw and Edmodo. Some schoolteachers also used social media

platforms such as WeChat to deliver teaching materials and receive homework from students.

Applying Flexible Teaching Modes
Various online teaching modes were used depending on the teaching content. For example, dual-mode teaching provided online teaching to CBSs and classroom-based instruction to local students. For some hands-on courses, CBSs were provided with recorded videos so that they could follow the instructions and produce the required work. For some outdoor activities, the teachers showed the onsite activities to the CBSs using their mobile phones.

Hiring Classrooms for CBSs
Almost all CBSs had online classes alone at home for more than a year. To give them a real classroom study atmosphere and increase their interaction with other students in class, some schools hired classrooms in Shenzhen where the CBSs could get together for online classes. Some schools even sent tutors to help with their studies.

Holding Examinations in Both Cities Simultaneously
To allow fair and open examinations for the students both in Hong Kong and on the mainland, schools set up examination centres in Shenzhen and sent the exam papers in advance by express courier. On the day of the examination, the students in both cities took the exam at the same time.

Providing Psychological Counselling
The CBSs were vulnerable to emotional problems due to having online classes at home alone for a prolonged period without direct interaction with their teachers and classmates. Some CBSs were also under great pressure to prepare for their Diploma of Secondary Education (DSE) exam. The schools were highly aware of these phenomena and provided online counselling services to help the CBSs handle their negative emotions and maintain their mental well-being.

4.2 Themes Matched with the TPB Components

Based on the components of the TPB, three dominant themes were identified regarding the education transformation strategies: teachers' attitudes and motivation towards the education transformation, their perceived social support network for education transformation and their perceived situational or environmental facilitators and barriers that eased or hampered the education transformation.

Attitudes Towards Education Transformation
Analysis of the interview data revealed the attitudes of the staff towards the education transformation strategies, the related behavioural beliefs, and outcome evaluation that influenced the teachers' intention to adopt the education strategies.

Most of the interviewees expressed highly positive attitudes towards the education transformation triggered by the pandemic. The most frequently mentioned reasons for the transformation were the pressure and challenges encountered by schools with CBSs

such as the student dropout rate when resuming face-to-face education in Hong Kong schools seemed impossible or highly uncertain. According to a survey, about 15% of CBSs dropped out of their Hong Kong schools and enrolled in expensive international schools or schools for Hong Kong students in Shenzhen (Hong Kong Federation of Education Workers 2021).

> *If we hadn't carried out the appropriate education transformation strategies, or if we had failed to establish online education platforms, we were now facing survival pressure because of the dropping out of CBSs. These pressures were the driving forces for our education transformation during the pandemic. (School principal 2)*

The teachers interviewed also held positive attitudes towards the necessary education transformation in response to the pandemic. One much mentioned reason was the 'inevitable trend of online education, not only in Hong Kong but around the world.

> *When the pandemic first started, most of us thought it would not last long, maybe three to six months. But it has been more than two years now and the pandemic is still rampant in Hong Kong and around the world. Even schools with only local students in Hong Kong have had to implement education transformation and adopt online teaching and learning, so that while classes are suspended, learning continues. We, the schools with CBSs, have no excuse or reason not to adopt similar education transformation strategies. (Secondary school teacher 3)*

Another factor much mentioned by the interviewees was a generally positive attitude towards online learning and teaching because of their past experience.

> *Thanks to the Community Care Fund Scheme of the Education Bureau, we had implemented a campus digitalisation system called BYOD (Bring Your Own Device) with the aid of the fund even before the pandemic. We had mastered the fundamental knowledge and skills of online education and had real practice in online education before the pandemic broke out. (Primary school teacher 5)*

The significant level of motivation to introduce education transformation was closely related to the determination of the school staff and their evaluation of the outcome of such transformation strategies. As one vice-principal put it:

> *Our management team and teaching staff are clear that education transformation is the only way forward. The more determined we are to adopt this transformation, the more successful we will be. I'm glad to tell you that after the first few weeks of online teaching and learning practice, our teachers feel more confident and even come to love the online education method. (School principal 1)*

Social Support Networks

The motivation to implement education transformation was also derived from the support of the key stakeholders of the schools with CBSs. When asked about the approval or disapproval of the education transformation strategies by people important to the schools,

the CBSs and their parents were found to have played a prominent role in influencing the transformation.

The CBSs were the primary internal stakeholders of the schools in this situation. Their attitudes and feedback directly affected the adoption of the online education strategies. Most interviewees felt encouraged by the satisfaction of the CBSs with these measures, including the different education modes to support the students' continuous learning at home, such as real-time online classes, recorded videos, individual online tutorials, psychological support groups for online learning and the provision of learning materials by express courier.

My students were not used to online learning at first. For example, they did not know how to use electronic devices, and younger students had difficulty following the order of the online classroom. With the guidance and supervision of our teachers, they gradually adapted to the online classroom order and learning environment. (Primary school teacher 3)

Interviewees from secondary schools were concerned about the continuous decline in the performance of some students because online classes continued for so long. They also worried that students might become lazy without supervision when studying at home alone. However, they seemed most concerned about the emotional problems of the CBSs, who experienced more emotional stress over the prolonged period of online learning at home. The students who were to take the Hong Kong Diploma of Secondary Education Examination felt especially anxious about their academic performance. All of these factors increased the CBSs' psychological problems.

Our school provides online counselling services for our students to relieve their stress and address their emotional problems and concerns in addition to assisting them to adapt to online learning. I'm glad to say that our efforts have paid off. Most of the CBSs can overcome their psychological problems and their online learning problems. Generally speaking, they are doing a good job of online learning. (Secondary school teacher 5)

Some schools came up with creative ways to help the CBSs to interact with their classmates by setting up learning centres in Shenzhen so that students stuck on the mainland were able to attend classes together and enjoy the interaction they needed.

The pandemic has lasted for years, and it seems it will continue for some time. So, we have had to find other ways to improve the learning environment for our CBSs besides online education. We hired some classrooms from a language centre near the border in Luohu. The CBSs can now go to school in a real sense and study with their classmates. So far, this strategy has worked quite well. The students say that they are happier as they are able to play and communicate with their friends. They are more motivated to attend class and more able to hand in homework on time. (Secondary school teacher 3)

The interviewees also expressed gratitude towards the parents of the CBSs for their understanding, cooperation and support. During the hard times of the pandemic, the

parents of the CBSs devoted extra effort to after-class tutorials for their children's homework, encouraged and helped their children to take part in the online activities initiated by the schools, formed parents' groups on WeChat to cooperate with the school teachers and so on.

> *Our special thanks go to the parents. Their support and assistance during the pandemic mean a lot to us. I remember when we first told them that we wanted to set up an education centre in Shenzhen where their children could go for online learning together with other CBS classmates. However, they had to share the expense of renting the learning centre. Almost all of them were very supportive of our plan and willing to accept the expense. We were so impressed and thankful. (Secondary school teacher 7)*

Some interviewees stated that mutual understanding between the teachers and parents of the challenges and difficulties involved helped a great deal with the transformation from face-to-face teaching to remote online learning.

> *At the very beginning we had a hard time shifting education from the in-person classroom to virtual learning. The online platforms such as Google Classroom in Hong Kong don't work on the mainland. We had to send the CBSs recorded lectures but the feedback from the students was disappointing. We were worried. Their parents were also worried. Before we established our own online teaching platform, we tried WeChat, we tried Zoom and we tried Seesaw. Each platform has its own functions, and the operations are different in various ways. Without help from the parents, the online teaching would certainly not be as successful as it is today. (Primary school teacher 1)*

Two interviewees from the same school mentioned support from one of the school board directors.

> *The director has property projects in Shenzhen. From the very beginning of the pandemic, he generously offered to help our CBSs in Shenzhen. He rented the two learning centres, one at Luohu and the other at Futian, for the CBSs to attend classes. Neither the parents nor the school needed to share the expense of the venues. (Secondary school teacher 4)*

Situational and Environmental Facilitators and Barriers

Most interviewees also attributed the smooth running of online education for CBSs to external facilitators such as assistance from government authorities, NGOs, sister schools in Shenzhen and even some pressure groups such as the CBS Policy Concern Group.

The view of most interviewees was that the government should play an important role as the major facilitator of education transformation for schools with CBSs. The government launched point-to-point cross-boundary transportation in 2020, but this was called off after 18 days when Covid-19 cases rebounded.

We hope that the government can take more proactive measures to help our CBSs stuck on the mainland. We urge the government authorities to relaunch a point-to-point coach programme to take students from Shenzhen Bay boundary points to HK schools because the children are really desperate to learn at school with their teachers and peers. (Primary school teacher 2)

The Hong Kong government authorities were aware of the challenges facing the schools with CBSs and tried hard to take measures to help. For example, the Education Bureau commissioned a service provider to offer programmes on psycho-social support and learning support in Shenzhen from May to July 2021 through face-to-face sessions in small groups for primary and secondary CBSs residing in Shenzhen. Some general service points were also set up in Shenzhen to provide CBSs and their parents with useful information, learning and emotional support materials and free-of-charge services to borrow books, recreational equipment and facilities.

It is good that the EDB has allocated special funds for underprivileged CBSs and paid for their electronic equipment. But more needs to be done by the EDB and other government departments. For example, the EDB should formulate a plan to hold discussions with various departments of the Shenzhen Municipal People's Government on the feasibility of resuming classes for CBSs. We sincerely hope the CBSs can be given priority if there is a quarantine-free border reopening between Hong Kong and the mainland. (Secondary school teacher 1)

Many schools with CBSs in the North District were found to have sister schools in Shenzhen. These sister schools sometimes invited the CBSs to their campus to attend activities with their students. Some NGOs such as Tuen Mun Women's Association came to help by setting up a project called 'Integrated Service Centre' in Nanshan District, Shenzhen, to provide support and services for CBSs and their families during the pandemic. For example, the centre released timely information on epidemic prevention, quarantines and the resumption/suspension of classes. It also provided consultation and referral services, organised sharing sessions, social activities and parent–child interaction activities, and held tutorials for both CBSs and their parents on the use of online educational equipment.

When asked about the barriers to education transformation, almost all interviewees listed a number of difficulties and challenges. The barriers mentioned most often included problems with accessing online platforms in mainland China, poor WiFi connections at home, lack of electronic devices for CBSs from underprivileged families, difficulties in teaching practical courses, the extra workload for teachers, loneliness among CBSs studying at home alone, and difficulties in mailing exam papers to CBSs for simultaneous examinations.

I am sure that all the schools with CBSs encounter more or less the same difficulties and challenges we do. We really enjoy a sense of achievement after we have successfully overcome these barriers, although we know plenty of difficulties and challenges still lie ahead. (Primary school teacher 4)

Self-efficacy refers to people's degree of confidence in their ability to perform a behaviour in the face of various obstacles or challenges. In this study, it is defined as the interviewees' perceived ability to adopt online education for their CBSs. Despite all of the difficulties of education transformation for the CBSs, almost all of the interviewees felt confident about conducting online teaching and learning. As one principal put it:

> *Only when our teachers have mastered online education knowledge and skills can they adapt to the education transformation. We therefore offered our teachers workshops on how to use platforms such as Teams and Zoom. We also organised sharing sessions for the teachers to exchange ideas and experiences of online teaching. Our IT unit tries its best to provide timely technical support when teachers encounter difficulties. Our tech-savvy teachers are now capable of conducting online education. (School principal 3)*

5 Discussion and Conclusions

The pandemic has changed education delivery methods around the world. Online teaching, blended teaching and mixed-mode teaching have become major educational methods. This study focused on the education transformation strategies adopted by schools that have a special student subgroup, the Hong Kong–Shenzhen cross boundary students, who have been unable to commute to school across the checkpoints between the two cities because of Covid-19 immigration quarantine measures. This qualitative study aimed to investigate the attitudes and intentions of teaching staff in schools with CBSs towards the resulting education transformation within the framework of the theory of planned behaviour.

Attitudes and Beliefs

This study found that the interviewees believed education transformation was a 'must-do' rather than a 'to do or not to do' choice. Their attitudes towards the education transformation were almost all positive. In addition, the outcome of the education transformation strategies was evaluated as highly satisfactory and successful. This is quite different from the research findings from the numerous applications the theory of planned behaviour to predict and understand topics such as smoking behaviour and its determinants, in which the interviewee samples encompass both positive and negative attitudes towards the behaviour. The uniqueness of the one-dimensional attitudes in this study towards the research topic and its findings enriches the knowledge pool of the theory of planned behaviour and its application.

Subjective Norms

The subjective norms in this study were derived from the interviewees' perceptions of what significant others thought about the education transformation. The feedback and support from the cross-boundary students and their parents, who were regarded as the schools' primary internal stakeholders, were found to play a fundamental role in the smooth implementation of the education transformation. Without their cooperation, understanding and assistance the transformation might not have been so successful.

The subjective norms also included the interviewees' motivation to comply with such norms. Almost all of the interviewees were willing to overcome the various difficulties and devote their efforts to education transformation. The motivation to comply came not only from the support of important stakeholders but also from the fact that online education was their response to the pandemic and even an 'inevitable trend' to achieve the suspension of classes without suspending learning around the world.

However, it was found that the negative impact of prolonged online learning at home without interaction with classmates and teachers led some CBSs to drop out of their schools. This did not indicate the failure of the education transformation, but rather that other easier (although perhaps more expensive) solutions were found by their parents, such as sending their children to private international schools in Shenzhen.

Perceived Behavioural Control and Behavioural Intention

According to the TPB of Ajzen (1988), the construct of perceived behavioural control is often assessed by the ease or difficulty of the behaviour, while self-efficacy is operationalised by the individual's confidence in being able to carry out the behaviour in challenging circumstances. This study found that assistance from government authorities (such as the EDB), NGOs (such as the Tuen Mun Women's Association), technology companies in mainland China and sister schools in Shenzhen served as environmental facilitators that positively influenced the intention and implementation of the education transformation. Although a long list of barriers was identified, the interviewees felt very confident about conducting online teaching and learning tailored to the CBSs.

A major limitation of this study is that the schools were not randomly selected, but rather based on the personal network of the researchers. This limitation may influence the generalisability of this study, although the findings are believed to be applicable to conditions within a similar context.

In conclusion, the TPB in this study offers insights into what enabled schools with CBSs to carry out education transformation from intention to the planned behaviour during the pandemic and beyond. The behavioural intention to adopt the education transformation by the schools was determined by the combination of positive attitudes among the teaching staff towards the transformation strategies, perceived social support from the key stakeholders of the school, and perceived control, including the required skills and abilities of the teaching staff. A strong intention is assumed to be the immediate antecedent of behaviour, which in this study was the implementation of the education transformation.

From a policymaking perspective, the findings provide evidence and suggestions for government authorities to help them make informed decisions on policy changes to support CBSs in a timely manner. The study also offers school management insights into the cultivation of positive attitudes among their teachers towards education transformation, seeking support from students and parents, and simultaneously addressing the real concerns and needs of the CBSs. Based on the in-depth interviews with teachers, the widely recognised effective ways to cultivate positive attitudes among their teachers towards the education transformation used by school managements included, but were not limited to, emphasising education transformation as a necessity rather than a choice for schools with CBSs, fostering a strong belief in online education as an inevitable trend during the

pandemic and beyond, and enhancing teachers' self-efficacy by providing workshops, sharing sessions, timely technical support and psychological care.

Although online education is widely recognized as the alternative way to achieve the goal of suspending classes without suspending learning for the CBSs, almost all interviewees hold the view that online education is no substitute for in-person schooling. The paradigm transition from face-to-face education to online education for the CBSs during the pandemic has already resulted in such disadvantages as technological constraints, lack of a sense of belonging and connectedness, the presence of distractions, and lack of engagement. The government and the schools with the CBSs should facilitate the in-person education environment in which the CBSs can once again communicate and interact with each other, develop their full range of emotions and capacity to express themselves, and learn basic social skills.

The pandemic will not last forever, but online learning is set to stay. Even in the post-pandemic era, there will be times when CBSs are unable to attend face-to-face classes in Hong Kong, for example, under circumstances such as a T8 gale warning or a black rain warning. Online education will then be the best option to facilitate the learning of these 'little drifters' without them taking pains to cross boundaries for classes.

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Exploring the Roles of Cognitive and Affect Empathy in Enhancing Prosocial Bystander Behavior in Simulated Cyberbullying Context

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Abstract. This study investigates whether the activation of cognitive and affective empathy can enhance prosocial bystander behavior in a simulated cyberbullying context. This study hypothesizes that the activation of cognitive and affective empathy can enhance one's prosocial bystander behavior in encountering cyberbullying. Also, the effect of the activation of empathy is assumed to be moderated by the presence of other bystanders. A 3 (activation of empathy: cognitive/affective/no activation) × 3 (the presence of other bystanders: positive bystanders/active negative bystanders/passive negative bystanders) factorial experimental design was used in this study. One-hundred fifty participants were randomly assigned to one of the nine conditions. Researchers used the Cyberbullying Questionnaire to screen and select suitable participants. Participants watched an empathy induction video (except for the control group without any activation of empathy), viewed the cyberbullying post on simulated social media, and gave their reactions and responses to the post. Results showed that there was no significant interaction effect between activation and presence of other bystanders on prosocial bystander behavior. The main effects of activation of empathy and presence of bystander on prosocial bystander behavior were significant, respectively. Participants in conditions with cognitive empathy activation had significantly higher proportion engaged in prosocial bystander behavior than those without any activation of empathy. Also, participants in conditions with the presence of positive bystanders had significantly higher proportion engaged in prosocial bystander behavior than those with passive negative bystanders. These key findings imply the importance of incorporating perspective-changing of bystanders and experience sharing of positive bystanders into cyber-bystander psychoeducational interventions that targeting youths, adolescents, and teenagers.

Keywords: Cognitive activation · Empathy activation · Bystander · Cyberbullying

1 Introduction

Although increasing countries have been introducing and imposing legal regulations and sanctions against cyberbullying (Tagaymuratovna 2022), it can still be very challenging to stop and combat cyberbullying when many witnesses serve as passive

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cyber-bystanders (Eldridge and Jenkins 2020). Recent cyberbullying research have strongly advocated cyber-bystander intervention to prevent and encounter cyberbullying (Eldridge and Jenkins 2020; Taylor et al. 2019; Torgal et al. 2021), but online anonymity, presence of bystanders, lack of empathy with victims, and low moral engagement may lower bystanders' ethical responsibilities and are less inclined to offer help in cyber-bullying conditions (Macháčková, 2020; Rudnicki et al. 2022; Song and Oh 2018; You and Lee 2019). Over a decade ago, researchers have begun their investigations of online bystander effect in cyberbullying situation (Blair et al. 2005; Palasinski 2012). Even though cyber-bystander intervention plays a vital role in preventing cyberbullying, there are only a few existing cyberbullying interventions (based on Bystander Intervention Model, BIM) specifically targeted on behavior of cyber-bystanders who witnessed the cyber-bullying incidents (DiFranzo et al. 2018; Kazerooni et al. 2018; Palladino et al. 2016; Williford et al. 2013).

Moreover, cyberbullying occurrence often happens in the presence of bystanders. According to a survey conducted by the United Nations Children's Fund (2014), 88% of youth had been bystanders in cyberbullying incidents, and among them, about 50% ignored the bullying acts, 9% even participated the bullying, but only less than 15% attempted to stop the bullying acts. These passive attitudes of cyber-bystanders can silently encourage the cyberbullying acts and increase the harmfulness of cyberbullying on victims (Kowalski 2008). On the contrary, healthy bystanders can take proactive and prosocial actions to stop cyberbullying and support victims (Brody and Vangelisti 2015). Thus, it is important to educate cyber-bystanders to act prosocial bystander behavior in supporting victims and combating cyberbullying.

Recent research have consistently found that empathy is one of the possible protective factors against cyberbullying or negative cyber-bystander behavior (Barliǹska et al. 2013, 2018; DeSmet et al. 2016). Furthermore, previous studies showed that people with higher dispositional empathy may be more likely to act prosocial online behavior to intervene in the cyberbullying case and support the cyber victims (Macháčková 2020; Macháčková et al. 2015; Macaula and Boulton 2017). An experimental study conducted by Taylor et al. (2019) found that activation of empathy did not activate greater empathy but significantly predicted bystander intervention. The findings of another research (Barliǹska et al. 2018) indicated that only cognitive empathy activation can increase the likelihood of prosocial bystander behavior, but not affective empathy activation.

Hence, the purpose of this study is to investigate the effects of activation of empathy (affective, cognitive or none) and the presence of various types of bystanders (positive, active negative, or passive negative) in increasing the likelihood of one's prosocial bystander behavior in a simulated cyberbullying situation.

1.1 Definition and Impacts of Cyberbullying

The most commonly used definition of cyberbullying is "any conduct performed through electronic or virtual media by people or organizations that repeatedly communicates opposed or competitive messages intended to inflict harm or pain on others" (Tokunaga 2010). Specifically, the definition of cyberbullying is the use of smartphones, internet or other digital devices to post or send texts or pictures to hurt or embarrass another person

(Chapin 2014). Thus, cyberbullying is an intended action that makes damaging to harm the victim via the Internet.

Cyberbullying perpetration and victimization are associated with numerous psychosocial, physical and intellectual health issues, which include stress, suicidal ideation, depression, anxiety, loneliness, substance abuse, reduced life satisfaction, decreased self-esteem, somatic troubles and decrease instructional achievement (Kowalski et al. 2014). Schenk and Fremouw (2012) stated that cyberbullying is a key stressor to the victims by increasing their rates of trauma symptomology.

1.2 Bystander Effect

Latané and Darley's (1970) five-step model can be used to explain the face-to-face bystander phenomenon. Their five-step Bystander Intervention Model (BIM) suggests the unique circumstances underneath which bystanders would more likely to intervene in a crucial situation: first, bystanders have to note the situation; second, they have to determine the situation as an emergency; third, they have to sense responsible to intervene; fourth, they have to reflect on how to help, and fifth, they want to determine to intervene and enforce their decision. If any of these steps is missing, bystanders do not get involved (Latané and Darley 1970).

Previous research consistently revealed that increasing number of people witnessing a critical situation, the willingness of the individual's intervention decreased (Darley and Latané 1968; Fischer et al. 2011). Moreover, the presence of other bystanders may impede the intervening actions proposed by the five-step model because this influences the perception of responsibility (Darley and Latané 1968). This can be explained by their tendency to mentally unfold the responsibility to intervene among all bystanders, which includes themselves, therefore diminishing the experience of their own responsibility. In turn, this diffusion of responsibility inhibits people from intervening, setting up it as the key reason of the bystander effect. Nevertheless, many previous studies about the bystander effect have not explicitly measured the effect of the presence of other bystanders on the diffusion of responsibility (Darley and Latané 1968; Fischer et al. 2011).

1.3 Bystander Effect and Cyberbullying

The face-to-face bystander effect has been applied to cyberbullying, but mixed results were found. Brody and Vangelisti (2015) found that people are more likely to intervene when the number of bystanders is small, but Obermaier et al. (2014) argued that there is no linear relationship between the number of bystanders and online prosocial bystander behavior. One possible explanation for these inconsistent findings is that online bystanders are often unaware of the actual harm caused to the cyber victims and lack of empathic concern to them (Kraft 2011).

The key features of online anonymity and asynchronicity for bullies, victims and bystanders provide an environment for cyberbullying (McKenna and Bargh 2000). This online environment facilitates the diffusion of a sense of responsibility (McKenna 2008). Hence, in online environments, bystanders have lower intention to help the victims as compared to offline bullying (Barlińska et al. 2013). Although some research found that

bystanders were more likely to offer help or intervene cyberbullying when they recognized that cyberbullying was happening (Dillon and Bushman 2015), when fewer people were "active" on the online message board (Markey 2000; Voelpel et al. 2008) when the number of bystanders was small (Brody and Vangelisti 2016), and when the cyberbullying incidents were more serve (Bastiaensens et al. 2014). Furthermore, Bastiaensens et al. (2014) stated that bystanders' responses and reactions to cyberbullying play an important role in enhancing healthy and prosocial bystander behavior. Furthermore, Pfetsch (2016) pointed out that the role of bystanders is critical because they can stop and counter the cyberbullying behavior, actively support cyberbullying, and passively observe cyberbullying but do nothing.

Although it is important to explore the effect of this diffusion the responsibility among bystanders in cyberbullying, this study focuses more on the presence of different types of bystanders rather than the number of bystanders. There are several types of bystander behavior to bullying -- such as active defending, active negative, and passive observing. Active defending refers to intervening on behalf of victim by directly antagonizing the bully, looking for help from third-party, calming victim after bullying incident (Salmivalli et al. 1996) and support the victim such as showing empathy (Matsunaga 2010). On the contrary, passive observing is watching and noticing but doing nothing (Kowalski and Limber 2007). In cyberbullying, prosocial bystander behaviors refer to offering help to or defending for the cyber-victim, against the cyberbully, seeking for help, reporting the incident or calming or showing support to the cyber-victim. Negative bystander behaviors refer to joining the cyberbullying, and passive bystander behavior refers to witnessing and doing nothing (Bastiaensens et al. 2014).

According to the suggestions from Brody and Vangelisti (2016), the presence of others could be conceptualized as a bystander by counting the number of views and comments of bystanders. In this study, we focus on designing experimental conditions that can capture the presence and comments of three types of bystanders – positive bystanders (active defending), active negative bystanders (active negative), and passive negative bystanders (passive observing but doing nothing).

1.4 Empathy

Empathy is defined as "a response that is more appropriate to the certain situation of the others than to one's own" (De Vignemont and Singer 2006). Empathy has been found to be highly related to prosocial behavior by understanding and sharing the emotional and mental states of others is the critical first step (Eisenberg and Strayer 1987). Empathy can be conceptualized in two aspects – 1) sharing and understanding of emotional states of another person which is defined as affective empathy and 2) perspective taking and mentalizing of what another person is feeling by inference which is defined as cognitive empathy (Hoffman 2000).

Affective empathy (Eisenberg 2000; Hoffman 2000) is a basic process similar to the emotional content of afferent stimuli. It manifests itself as the ability to perceive and experience the emotions of others effortlessly. This ability to respond to the state of others is considered congenital, or it appears early in the development of the individual. In addition, affective empathy is activated by the automatic or innate capacity in responding

with arousal to the signs of discomfort or other affectional state from others (Preston and De Waal 2002).

Cognitive empathy is an ability to understand the feelings, beliefs and intentions of others (Decety and Jackson 2004). It is the basis for the ability to abstract from specific or directly available situations. In addition, cognitive empathy controls the ability to predict the consequences of one's behavior on others, including violent behavior. Cognitive empathy is not limited by many of the ways in which emotional empathy can occur, such as the need to directly contact another person and share their emotional state. Activation of more advanced modes of empathy stimulus (such as a change in perspective) triggers qualitatively different responses. These processes may expand over time and be controlled by the will, thus greatly expanding the scope of empathy beyond direct interaction (Hoffman 2000).

1.5 Empathy, Bystander Effect, and Cyberbullying

Empathy is considered as one of the viable mechanisms of altruistic or prosocial behavior (Szuster 2016). Increasing empathic concern would increase likelihood to offer help to others (Frankel 2017). The role of empathy in mitigating negative bystander behavior is particularly important in the context of cyberbullying. The cognitive and emotional components of empathy have been shown to reduce aggressive behavior (Jolliffe and Farrington 2004).

Unfortunately, online bystanders do not have to watch a bullying physically, bystanders may view cyberbullying materials or comments on social networking sites as entertainment and do not recognize the harm to the victims. Failure to empathize with victims lead to bystander inaction (Van Cleemput et al. 2014). Even worse, the role of bystander would be more easily changed to cyberbullying (Cowie and Jennifer 2008). Importantly, empathetic concern is malleable and can be improved through intervention (Zaik 2014).

Recent studies have often found empathy is one of the key protective factors to defend the victims of cyberbullying or to avoid the negative cyber-bystander behavior (Barliǹska et al. 2013, 2018; DeSmet et al. 2016; Macaula and Boulton 2017). People with higher dispositional empathy may be more likely to act prosocial online behavior to intervene in the cyberbullying case and support the cyber-victims (Macháčková 2020; Macháčková et al. 2015; Macaula and Boulton 2017). In addition, activation of cognitive and affective of empathy has been shown to reduce negative bystander behavior in cyberbullying (Jolliffe and Farrington 2004). Nevertheless, mixed findings have been found on whether activation of empathy influences prosocial bystander behavior.

Even though affective and cognitive empathy could possibly make connections to offer help (Bloom 2016). Van Lange (2008) suggested that the activation of affective state of empathy by observing and imagining the same state in another person could trigger people's altruism to help others. An experimental study conducted by Taylor et al. (2019) found that empathy nudges did not trigger more empathy but significantly predicted bystander intervention. Barlińska et al. (2013) found that when either affective or cognitive empathy was activated among bystanders, bystanders were less likely to share cyberbullying content to more audiences and were more likely to delete the cyberbullying posts and materials. Nevertheless, the findings of another research (Barlińska et al.

2018) indicated that only activation of cognitive empathy can increase the likelihood of prosocial bystander behavior in cyberbullying situation but not affective empathy activation. It is suggested that cognitive empathy induction can significantly increase helping behavior of online bystanders because it can provide a capacity for conscious and reflective appraisal of other's situation by perspective-taking (Barlińska et al. 2018).

1.6 The Present Study

The present study aims to examine the relationship between activation of empathy and prosocial bystander behavior in the simulated cyberbullying context. This study also investigates the interaction effect of empathic activation and presence of different types of cyber-bystanders on the likelihood of prosocial bystander behavior in viewing cyberbullying situation. Although existing studies (Barlińska et al. 2013, 2018) have investigated how empathic activation and presence of bystanders on prosocial bystander behavior in cyberbullying, the interaction effect of activation of empathy and presence of different types of cyber-bystander on their prosocial responses and reactions to cyberbullying situation has not been deeply explored. This indicates that the present study has significant theoretical and conceptual contributions.

Furthermore, with better understanding of the main and interaction effects of activation of empathy (affective and cognitive) and presence of different types of bystanders (social and contextual) can contribute to the development of empirical-based and comprehensive cyber-bystander psychoeducational and psychosocial interventions to enhance prosocial bystander behavior (behavioral) to support the cyber-victims and to reduce cyberbullying (cognitive - perspective). According to a study conducted by the Hong Kong Playground Association (2013), 73.7% of youth people in Hong Kong, Macau and Guangzhou were bystanders in cyberbullying incidents, the research from United Nations Children's Fund (2014) also found that 88% of adolescents in Hong Kong were bystanders in cyberbullying and half of these bystanders just witnessed cyberbullying without taking any intention or actions to offer help. Hence, this study has practical significance and social importance to address the urgent need to alleviate cyberbullying and support the cyber-victims.

1.7 Conceptual Framework and Hypotheses

Figure 1 (on the next page) depicts the conceptual framework of the present study. The positive cyber-bystander behavior is the dependent variable in this study and the activation of empathy (cognitive and affective) and the presence of different types of bystanders are the independent variables.

Based on the literature review, it is argued that activation of affective and cognitive empathy may increase one's online prosocial bystander behavior when viewing cyberbullying situation (support the cyber-victims and stop the cyber-bullies). Thus, the first research question is whether activation of cognitive and affective empathy can increase participants' prosocial bystander behavior. In this study, it is hypothesized that participants with activation of cognitive and affective empathy have higher likelihood for online prosocial bystander behavior than those without activation (H1).

Besides, previous literature suggested that increasing number of bystanders would inhibit the bystander behavior (Fischer et al. 2011) because people are more likely to intervene the cyberbullying on social media when the number of bystanders was small (Brody and Vangelisti 2016). Given that the effect of presence of bystanders on prosocial bystander behavior are still debatable, the present study focuses more on the presence of different types of bystanders (positive, active negative, and passive negative bystanders). Thus, the second research question is whether participants have higher likelihood on prosocial bystander behavior in the conditions with the presence of positive bystanders than the conditions with the presence of active negative and passive negative bystanders? It is hypothesized that participants in the conditions with the presence of positive bystanders would have significantly more prosocial bystander behavior than the conditions with the presence of active negative and passive negative bystanders (H2).

Finally, the present study attempts to investigate the interaction effect of activation of empathy and presence of different types of bystanders on the likelihood of participants' prosocial bystander behavior. Therefore, the third research question is whether participants with activation of empathy have higher likelihood for performing more prosocial cyber-bystander behavior under the presence of positive bystanders? It is hypothesized that the effect of activation of empathy on participants' prosocial bystander behavior is stronger with the presence of positive bystanders in the cyberbullying situation (H3).

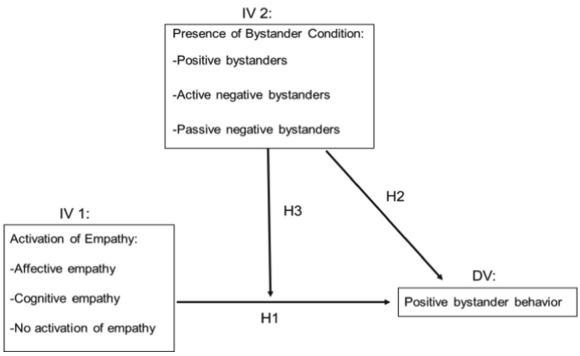

Fig. 1. Conceptual framework of the present study

2 Methods

2.1 Participants

One hundred fifty youth aged from 18 to 24 were recruited from several universities and postsecondary institutions in Hong Kong during Fall 2020. They were randomly assigned in one of nine experimental conditions. Each condition included a combination of the activation of empathy (affective, cognitive and no activation) and the presence of various types of bystanders (positive bystanders, active negative bystanders, and passive negative bystanders). Table 1 illustrates this 3 × 3 factorial experimental design with the description of nine conditions in this study.

Potential participants (aged 18–24) completed the Cyberbullying Questionnaire and those who received median-range scores were invited to participate in this experiment. The reason for choosing those with median-range scores because those scored at the upper-range are higher tolerance of cyberbullying whereas those scored at the lower-range usually neglect or ignore cyberbullying issues. Hence, excluding those who scored at both ends may ensure the validity of the experiment.

Table 1. Experimental design on the combinations of conditions with activations of empathy and presence of bystanders

Group	Activation of empathy condition	Presence of bystander condition
Group 1	Affective Empathy (AE)	Positive bystanders
Group 2	Affective Empathy (AE)	Active negative bystanders
Group 3	Affective Empathy (AE)	Passive negative bystanders
Group 4	Cognitive Empathy (CE)	Positive bystanders
Group 5	Cognitive Empathy (CE)	Active negative bystanders
Group 6	Cognitive Empathy (CE)	Passive negative bystanders
Group 7	No Empathy Activation	Positive bystanders
Group 8	No Empathy Activation	Active negative bystanders
Group 9	No Empathy Activation	Passive negative bystanders

2.2 Procedures

A pilot study with 30 participants was conducted to try out the procedures of the experiment. The data of the participants in the pilot study were excluded from the main study. Some modifications were made after the pilot study. No video clip was shown to the control groups without empathy activation. To enhance the internal validity and improve the flow of the experiment to let participants remember what they had watched in the induction video clip and simulated social media, the "watch film" part and "scrolling Simulated Social Media" part were moved before completing the QCAE.

This study adapted the experimental procedures in the studies conducted by Barlińska et al. (2018), but the materials and conditions were translated, modified, and developed into Cantonese version to tailor the culture of the participants. Also, the cyberbullying questionnaire was moved to the initial part as a screening measure and the QCAE was applied as a measure of empathy activation. Furthermore, the control condition for viewing cyberbullying post was added in the simulated social media. After the recruitment of subjects who met the screening criteria, the participants gave their consent and were randomly assigned to one of the nine conditions.

For the AE groups, participants watched the 2-min video clip about the cyberbullying incident described above. After that, they viewed the simulated social media by scrolling and watching the posts and messages on the simulated social media. They saw three posts,

one of the posts was the "Most viewed post" with the presence of different types of bystanders, the participants took actions such as comment and press "report" or "share" or "like" button to the posts. After that, the participants had to answer the manipulation check questions and completed the QCAE questionnaire. At last, a debriefing was given to the participants. For the CE groups, participants followed the same experimental procedures as the AE groups except they completed the manipulation check for cognitive activation. For the control groups, participants did not view the 2-min video clip and manipulation check for empathy activation but followed other experimental procedures same as the AE and CE groups. The total duration of the experiment was 18 to 20 min for AE and CE groups and was 16 to 18 min for the control group.

2.3 Measures and Materials

Simulated Social Media. A simulated social media page was developed for this experiment. In the simulated social media, three self-developed Facebook/IG posts were used to imitate the environment of social media. Among the three posts, one is titled as "Most viewed post" which is the experiment post about cyberbullying. Participants could take different kinds of actions in this simulated social media such as: 1) pressing "Like" button, 2) pressing "Share" button, 3) pressing "Report" button and/or 4) typing for

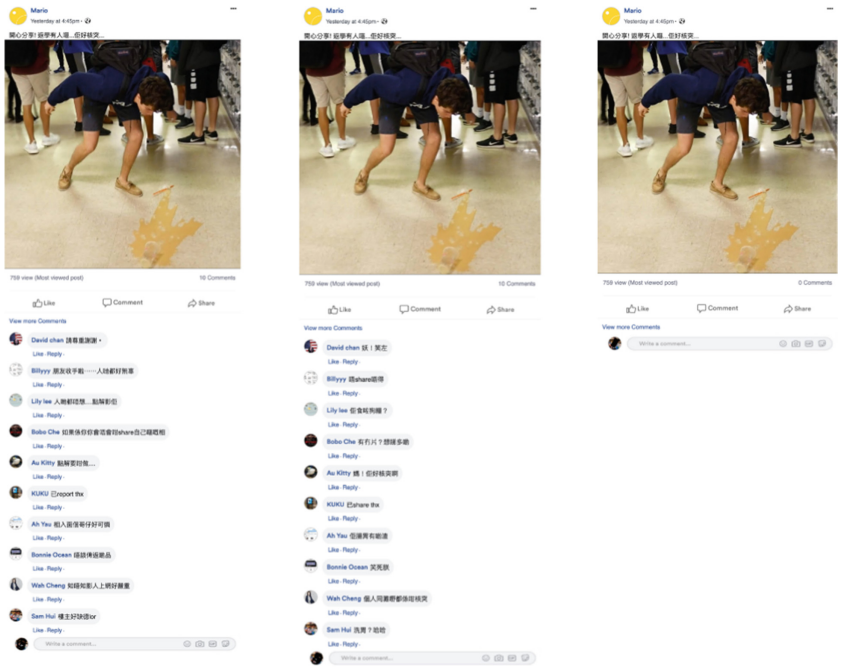

Fig. 2. The "Most Viewed Post" in Conditions with Positive Bystanders (a), Active Negative Bystanders (b), and Passive Negative Bystanders (c)

comment. The sample of the experiment posts with positive bystanders, active negative bystanders, and passive negative bystanders are shown on Figs. 2a–2c.

Prosocial Bystander Behavior. Several positive bystander behavior in the experiment such as pressing "report button" in the "Most viewed post" which referred to look for help from third-party (Salmivalli et al. 1996), typing the supportive comment (e.g. "I back you up (the victim)!") which referred to support the victim (Matsunaga 2010), and/or typing an comment to stop the bullies (e.g. "You are hurting someone else, stop it!") which referred to active intervention on behalf of victim (Salmivalli et al. 1996).

Negative Bystander Behavior. In the "Most viewed post" on the simulated social media, there were two types of negative bystander behavior from the participants: 1) Active negative bystander behavior and 2) Passive negative bystander behavior. Such as pressing "Like" button on the "Most viewed post" and/or typing an insulting comment to the victim in the post which referred to active negative bystander behavior by joining the cyberbullying (Bastiaensens et al. 2014). Passive bystander behavior referred to witnessing but do nothing (Bastiaensens et al. 2014).

Cyberbullying Questionnaire. The questionnaire about the attitude of cyberbullying (Mattioni 2012) was used as a screening tool to select participants based on their attitudes towards cyberbullying. The Cyberbullying Questionnaire include 15 questions for measuring the attitude towards cyberbullying. It uses the 5-point Likert-type scale (1 = Strongly Disagree to 5 = Strongly Agree). If a participant gets high score in an item, it means that the participant has a high awareness and intention to stop cyberbullying. On the other hand, if a participant gets lower scores, it means that the participant has a low awareness and intention to stop cyberbullying. A study (Green et al. 2016) found that the questionnaire about the attitude of cyberbullying is a valid and reliable instrument to measure the attitude toward cyberbullying with a Cronbach's reliability coefficient of 0.70. The Cyberbullying Questionnaire was translated from English to Chinese version and then back translated by an interpreter who are fluent in both languages and then cross-checked by the researchers to enhance the accuracy of translation.

Questionnaire of Cognitive and Affective Empathy (QCAE). The QCAE was used to check whether the induction of cognitive and affective empathy are successful. QCAE has good validity and internal consistency (Reniers et al. 2011) In the study of Lockwood et al. (2014), it showed that Cronbach's alphas for cognitive empathy subscale and affective empathy subscale are .87 and .88, respectively. The cognitive empathy subscale contains 15 questions for measuring the perspective taking (CE) for CE group and the affective empathy subscale contains 15 questions for measuring emotional contagion (AE) for AE group. Items are rated on a 4-point scale from "strongly disagree" to "strongly agree". The subscale scores represent the the disposition of CE and AE after empathy activation. Higher scores refer to higher disposition of CE and AE after activation of empathy. The QCAE was translated from English to Chinese version and then back translated by an interpreter who are fluent in both languages and then cross-checked by the researchers to enhance the accuracy of translation.

Empathy Activation Video Clip. The research from Barlińska et al. (2013) confirmed that watching the video clip of empathy activation was effective. Hence, a 2-min video was produced to present an cyberbullying incident in that shows the emotions and feelings of a cyber-victim and the victim's traumatic behavior after the incident. In the video, the victim was a university student who vomited in the classroom. His schoolmates took a picture for him and posted it on the social media, from then on, he became a figure of mockery. He experienced strong negative emotions and feelings such as being isolated, loneliness, shame, anxiety and fear. This cyberbullying incident impacted on his behavior such as staying at home to isolate himself and being absent from the class.

Manipulation Check for Activation of Empathy. Manipulation check was used to ensure the activations of affective and cognitive empathy were successful. Researcher checked the activation of empathy of participants after watching the 2-min empathy activation video clip. For the affective empathy conditions, their emotional contagion was checked by counting the number of emotional words to express empathic concern after watching the video. For the cognitive empathy conditions, their perspective taking was checked by answering a few manipulation-check questions about the main content of the video.

Most Viewed Post. To make a situation of diffusion of responsibility, the "Most viewed post" with a cyberbullying case was developed based on the presence of other bystanders would affect the bystander's responsibility to help (Darley and Latané 1968). Participants would see a picture of online post included a cyberbullying case on a university classmate. The number of views in the post was created and labeled as the most viewed post.

Bystanders. In each "Most viewed post", about ten cyber-bystanders replied to the cyberbullying post using comments. There were three bystander conditions in this experiment: 1) positive bystanders, 2) active negative bystanders, and 3) passive negative bystanders. Positive bystanders provided comments to support the victims or to stop the cyberbullying ("Please show some respect to him!" or "we should just stop it"). Active negative bystanders provided comments to join or encourage the cyberbullying. The styles of comments for both conditions were adapted from the study of Shultz et al. (2014). The condition of passive negative bystanders did not include any comments. The post for each type of bystander condition can be referred to Figs 2a–2c above.

Manipulation Check for Diffusion of Responsibility. Manipulation check was also added to ensure that diffusion of responsibility was existed among participants. Researcher analyzed the attitude of being a bystander through the choices from participants. There were two compulsory questions to test the diffusion of responsibility by asking the participants about the content of the "Most viewed post" and the comments from the bystanders.

2.4 Ethical Considerations

Participants signed the consent forms before taking part in the experiment. The consent form clearly stated that there are emotional and psychological risks by viewing

a video-clip and a post related to cyberbullying that might make the participants feel uncomfortable. For some participants, their emotions might be triggered by recalling and relating to their past experiences of being cyberbullied or bullying others. Therefore, referral counselling and psychological services were provided to participants if necessary. Participants were allowed to withdraw from the research or experiment at any time without any consequences. Deception was used in the initial consent form to hide the true purpose of the experiment. All subjects received a debriefing at the end to understand the true purpose of the experiment. The study maintained the anonymity of participants to ensure confidentiality. The research ethics application was approved by the Human Ethics Research Committee (HREC) of PI's affiliated university.

3 Results

This study conducted a 3 (Activation of empathy: affective, cognitive and no activation) × 3 (Presence of bystander: positive, negative, no bystander) factorial experimental design. Activation of empathy and presence of bystanders are the independent variables whereas the prosocial bystander behavior is the dependent variable. Two-way ANOVA was conducted to test the main effects and interaction effects of activation of empathy and presence of different types of bystanders on participants' prosocial bystander behavior.

3.1 Descriptive Statistics

The descriptive statistics included the frequencies of each condition. Table 2 (on the next page) shows that there were 17 participants in condition 1, 18 participants in condition 2, 16 participants in condition 3, 14 participants in condition 4, 23 participants in condition 5, 20 participants in condition 6 and 8, 10 participants in condition 7 and 12 participants in condition 9.

Prior to testing any research hypotheses, the researchers first tested the differences on the attitudes towards cyberbullying (screening variable) among conditions to ensure that there was no significant difference on their attitudes towards cyberbullying (should be within middle-range) among conditions. The one-way ANOVA results showed that there was no significant difference on attitude towards cyberbullying between conditions, $F(8, 141) = 0.843$, $p = .567$. Furthermore, there was no statistically significant difference across conditions on affective empathy, $F(8, 141) = 0.658$, $p = .728$, and cognitive empathy, $F(8, 141) = 0.546$, $p = .820$. These results indicated no prior differences on attitude towards cyberbullying, affective empathy, and cognitive empathy across the nine conditions.

One-way ANOVA was also conducted to test the group differences on prosocial bystander behavior in the simulated cyberbullying situation. Results showed that there was significant difference on prosocial bystander behavior between conditions, $F(8, 141) = 2.871$, $p = .005$. Further post-hoc analyses found that participants in cognitive empathy activation and positive bystander condition (condition 4, $M_p = .643$, SD = 0.05) had significantly higher proportion of subjects performing prosocial bystander behavior (comments and reactions to support the victim and/or to stop the bully) than

those participants in no empathy activation and passive negative bystander condition (condition 9, $M_p = .000$, $SD = 0.00$).

On the contrary, supplementary analyses also showed that there was significant difference on negative bystander behavior between conditions, $F(8, 141) = 6.246$, $p < .001$. Post-hoc comparison analyses indicated that participants in no empathy activation and negative bystander condition (condition 8, $M_p = .333$, $SD = 0.05$) had significantly higher proportion of subjects performing negative bystander behavior than those in affective and cognitive activation conditions regardless the presence of what types of bystanders (positive, active negative, passive negative) except condition 3 (affective empathy activation and passive negative bystander condition).

Table 2. Descriptive statistics of attitudes towards cyberbullying and prosocial bystander behavior

Condition	Sample size	Attitude towards cyberbullying		Prosocial bystander behavior	
	N	Mean	SD	Mean	SD
Condition 1	17	44.47	4.11	.2941	0.05
Condition 2	18	44.72	4.25	.2222	0.04
Condition 3	16	42.75	6.77	.0625	0.03
Condition 4	14	44.21	7.15	.6429	0.05
Condition 5	23	42.96	4.73	.3913	0.05
Condition 6	20	43.55	5.20	.2000	0.04
Condition 7	10	40.30	5.56	.4000	0.05
Condition 8	20	43.90	4.12	.2500	0.04
Condition 9	12	44.25	4.03	.0000	0.00

Notes:
Condition 1 = Affective empathy activation and positive bystanders
Condition 2 = Affective empathy activation and active negative bystanders
Condition 3 = Affective empathy activation and passive negative bystanders
Condition 4 = Cognitive empathy activation and positive bystanders
Condition 5 = Cognitive empathy activation and active negative bystanders
Condition 6 = Cognitive empathy activation and passive negative bystanders
Condition 7 = No empathy activation and positive bystanders
Condition 8 = No empathy activation and active negative bystanders
Condition 9 = No empathy activation and passive negative bystanders.

3.2 Main and Interaction Effects on Prosocial Bystander Behavior

Two-way ANOVA analysis was employed to examine the main effects of empathy activation and presence of different types of bystanders as well as the interaction effect of these two variables on participants' prosocial bystander behavior in the simulated cyberbullying situation. Table 3 shows that the interaction effect of empathy activation

× presence of bystander on prosocial bystander behavior to cyberbullying situation was insignificant $F(4, 141) = 0.334$, $p = .885$, $\eta 2 = .009$.

The main effect of empathy activation on participants' prosocial bystander behavior in cyberbullying situation was significant, $F(2, 141) = 4.078$, $p = .019$, $\eta 2 = .055$. The estimated parameters found that participants with cognitive empathy activation ($M_p = .386$, SD = .05) had significantly higher proportion of subjects engaged in prosocial bystander behavior than those without empathy activation ($M_p = .196$, SD = .04).

Furthermore, the main effect of presence of different types of bystanders on prosocial bystander behavior in cyberbullying situation was significant, $F(2, 141) = 7.580$, $p = .001$, $\eta 2 = .097$. The estimated parameters found that participants in the conditions with the presence of positive bystanders ($M_p = .439$, SD = .05) had significantly higher proportion of subjects engaged in prosocial bystander behavior than those in the conditions with passive negative bystanders ($M_p = .104$, SD = .03).

Table 3. The two-way ANOVA results on prosocial bystander behavior

Variables	df	*F*	*p*	η^2
Empathy Activation	2	4.078	.019	.055
Presence & Types of Bystanders	2	7.580	.001	.097
Empathy Activation x Presence & Types of Bystanders	4	0.334	.885	.009

4 Discussion

4.1 Activation of Affective and Cognitive Empathy

The purpose of this study is to investigate whether activation of affective and cognitive empathy can increase participants' likelihood to act prosocial bystander behavior (offer direct or indirect help to the cyber-victims or stop the bullies) in the simulated cyberbullying situation. It is hypothesized that activation of affective and cognitive empathy can significantly increase the likelihood of participants' prosocial bystander behavior in cyberbullying situation. The findings were consistent with previous literatures (Barlińska et al. 2018; Macháčková et al. 2015; Taylor et al. 2019) that only activation of cognitive empathy was effective to increase the likelihood of participants' prosocial bystander behavior in cyberbullying situation.

For the effectiveness of cognitive empathy activation, Barlińska et al. (2018) suggested that active taking of perspective of cyber-victims proved to be significant in enhancing positive bystander behavior. They further stated that cognitive empathy can be effectively activated in the form of a brief situational cognitive priming (e.g. watched a 2-min video clip in this study) to increase the availability, awareness, and concentration of cyber-bystander on the victim's perspective (Barlińska et al. 2018). In a recent study by Leung (2021), she found that increasing awareness of cyberbullying significantly and

positively explained the intervening behavior in a sample of 581 Chinese college students who had witnessed cyberbullying. In Leung's another study (2018) with a short intervention program, participants involved in a cyberbullying role-play, watched a documentary about cyberbullying, involved in group discussion, and completed a self-reflective writing task, had significant increase in their awareness of cyberbullying and their sympathy with cyber-victims after the intervention and maintained in 8-week follow-up. These findings indicate that future psychoeducational bystander intervention programs should consider incorporating repetitive and sustainable form of cognitive empathy training to support cyber-bystanders deeper understanding of cyber-victims' perspective and encourage prosocial bystander behavior (Barlińska et al. 2018).

Although noticing the occurrence of cyberbullying can significantly predict higher likelihood of cyber-bystander intervention (Dillon and Bushman 2015), only 10% intervened directly and almost 70% of cyber-bystanders intervened indirectly. This significant difference between direct and indirect can be explained by the social-cognitive approach (Decety and Jackson 2014). Indeed, activation of cognitive empathy requires the involvement of complex cognitive, evaluative, and interpretative processes for perspective taking of cyber-victims (Batson et al. 1997), which indicates that individuals may interpret the event and context of the cyber-victims differently (extent of emergency, sense of responsibility, and reflection to offer help) and thus perform different types and levels of prosocial bystander behavior. Barlińska et al. (2018) suggested that cognitive-empathy-motivated bystander intervention is more suitable and effective when individuals have higher mental flexibility to break through the self-other differentiation and get deep understanding of cyber-victim's situation and needs as well as connected to individual's favorable affects and behavior. Future bystander psychoeducational intervention should consider this social-cognitive model when designing tailored cognitive empathy induction.

The results of this study were also consistent to some previous findings (Barlińska et al. 2018) that activation of affective empathy did not significantly enhance prosocial bystander behavior as compared to the no empathy activation conditions. According to Preston and De Waal's (2002) perception-action model of empathy, affective empathy is triggered when one observes another person feels that automatically evokes their same affective states. Nevertheless, Kiesler et al. (1984) stated that affective empathy activation might be more difficult in cyberbullying context when emotional signals are mostly unavailable. In addition, Hoffman (2000) argued that direct contact is an important condition to effectively activate affective empathy, but this direct contact is not necessary for cognitive empathy activation. Furthermore, Taylor et al. (2019) also found that empathy nudges did not enhance bystander empathy. The negative affect triggered by the activation could lead to negative bystander behavior in cyberbullying. According to DeSmet et al. (2016), the observer who feels discomfort by affective empathy activation might try to keep a distance or respond in a negative way. Future psychoeducational bystander intervention should pay attention to allow participants to adjust the extent of negative affect triggered the affective empathy activation to maximize the effectiveness.

4.2 Presence of Different Types of Bystanders

As mentioned above, this study focuses more on the presence of different types of bystanders rather than the number of bystanders. This study hypothesizes that the presence of positive bystanders significantly increases the likelihood of one's prosocial bystander behavior as compared to those conditions with the presence of active negative and passive negative bystanders. The findings of this study only partially supported this hypothesis because participants in the positive bystanders condition were more likely to preform prosocial bystander behavior than the passive negative bystanders condition, but no significant difference was observed between positive bystanders condition and active negative bystanders condition.

In a recent study conducted by Leung et al. (2018), they created a simulated Facebook setting with two bystander conditions – the defend condition (positive bystander condition) in which with peers' comments to defend or help the cyber-victims versus the offending condition (active negative bystander condition) in which with peers' comments to support the cyber bullies or to further offend the cyber-victims. They found that participants (Hong Kong Chinese students) in the defend condition (positive bystander condition) had stronger normative beliefs to defend and support the victims. Hence, future cyber-bystander psychoeducational interventions should be designed to strengthen bystanders' normative beliefs so as to change them from passive offender to defender.

Although previous studies argued that the absence of bystander would enhance one's intention to perform positive bystander behavior in cyberbullying (Markey 2000; Song and Oh 2018; Voelpel et al. 2008). Song and Oh (2018) argued that the lack of bystanders' action (passive negative bystander condition) could be beneficial to the victims by blocking transmission of cyberbullying, but this lack of bystanders' action may exacerbate cyberbullying and weaken the bystanders' intention to intervene. On the contrary, Kazerooni et al. (2018) suggested the perceived unfairness of power imbalance in cyberbullying may affect the bystanders' willingness to perform prosocial behavior to defend the participants. In other words, with increasing number of people involved in cyberbullying (active negative bystanders), observers perceived larger unfairness and increased hurt to the cyber-victims when multiple bullies involved. Then, they are more likely to feel personally responsible and to act prosocial to defend the victim (Kazerooni et al. 2018). The results of this study were consistent to the latter perspective and therefore no significant difference was found between positive bystander condition and active negative condition.

5 Conclusion

In conclusion, the present study aims to examine the causal relationship between activation of empathy and engagement prosocial bystander behavior in the simulated cyberbullying context. This study also investigates the interaction effect of empathic activation and presence of different types of cyber-bystanders on the likelihood of prosocial bystander behavior in viewing cyberbullying situation. Results found that cognitive empathy activation and presence with positive bystanders can significantly increase the likelihood of participants to act prosocial bystander behaviors as compared to no

empathy activation and presence with passive negative bystanders. Certainly, the lack of interaction effect, the ineffective affective empathy activation, and the insignificant difference between positive and active negative bystander conditions need more further investigations. Furthermore, a major drawback of this study was the lack of background (e.g. developmental history) and demographic (e.g. gender) information for controlling potential confounding factors and testing subgroup differences. Another key limitation was each participant only exposed to one stimulated social media experimental setting which may not truly represent the real-life cyberbullying situation. Although with these limitations, this present study overall has theoretical significance, practical importance, as well as educational and social impacts in promoting bystander's prosocial behavior to alleviate cyberbullying.

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Cross-Disciplinary Skill Training at the Post-pandemic Workplace: A Case Study on Adapting Applied Behavior Analysis into Mainstream Teaching Practice

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Abstract. With interrupted schooling during the COVID-19 pandemic, children exhibited a wider range of behaviour problems after school resumed. Applied behaviour analysis (ABA) is an experimental approach which can precisely identify variables that exert direct effect on the problem behavior. However, it has rarely been introduced in traditional teacher training as its feasibility in applying in mainstream classroom has long been in question. This research is a case study with interviews that explores how an experienced teacher integrated ABA into her existing mainstream teaching practices. The inquiry process revealed that facilitating self-directed learning process (SDL) in a teacher in a self-organised learning environment (SOLE) helped the teacher develop her working theory to address her unique working needs. Also, reciprocal dynamics between mentor and mentee, and descriptive guidance within a supportive learning culture are crucial conditions for the development of a personal working theory that addresses the needs within the working context.

Keywords: Self-directed learning process · Self-organised learning environment · Teacher training · Behavior analysis · Cross-disciplinary learning

1 Introduction

The COVID-19 pandemic has been affecting children's physical and mental development and has posed different challenges to teachers at school. Children exhibit a wider range of maladaptive behaviors with greater degree at school than in pre-pandemic times, such as tantrums and rule-breaking (Yoshikawa et al. 2020). Such phenomenon can be attributed to deprivation from opportunities to learn and practice social skills, both verbal and behavioral, in social settings such as school amid the COVID-19 pandemic. These needs cannot be fully addressed without applying more specific behavioral management knowledge and skills from other disciplines (Benner and Mistry 2020). Foundation teacher training includes topics on supporting children with learning needs; however, practitioners claimed that they cannot effectively apply the acquired knowledge and skills in supporting children with wide range of learning needs in their daily classroom operation, due to the de-contextualization of these knowledge and skills from their involved

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school culture and operation (Lee et al. 2015). It is reasonable to assume that behavioral and other needs brought by various stages of the pandemic including post-pandemic will continue and would require teachers to address all these needs in class after school resumes. There is a dire need to enable teachers to explore and integrate relevant knowledge and skills from any discipline into their existing repertoire to address their own needs, those of children and organization in a dynamic working environment. This study adopted a case study research design to investigate 1) conditions that facilitate cross-disciplinary knowledge and skill integration at workplace; 2) how to effectively unfold self-directed learning (SDL) in a self-organized learning environment (SOLE); 3) the role of mentorship in vocational training; and 4) conducive factors for the development of personal working theory at the workplace.

Applied behavior analysis (ABA) is a discipline of behaviorism and applied psychology (Trump et al. 2020). The approach takes into account contextual factors including antecedents that immediately precede the behavior, and consequences that immediately follow (Cooper et al. 2020). It adopts direct observational analysis that identifies the functional relationship between variables in which a particular variable (the independent variable) poses an effect and leads to a systematic change on the particular behaviors (the dependent variable) in the particular context at the particular time (LeBlanc et al. 2016). By analyzing the systematic changes of the dimensions of a target behavior in response to the systematic changes of contextual variable(s) in the involved context, the causal relationship between variables can be identified and the target behavior can be controlled by manipulating the variables that exert direct effects on the behavior (Cooper et al. 2020).

The experimental nature of the ABA approach has long been criticized for its infeasibility in non-clinical settings (Fennell and Dillenburger 2018). Firstly, an experimental-oriented approach that emphasizes factor manipulations and functional relationship identification common in science disciplines is not common in the education discipline, and has not been introduced to teachers as a required skill set in professional teacher training (Beaulieu et al. 2018). Therefore, the experimental-oriented approach is considered an approach that belongs to the discipline of science, unrelated to the teaching profession.

Secondly, in traditional data collection and analysis practice in teacher training, teachers adopt retrospective approach in which they rely on their memories to report their impressions about a concerned incident by completing surveys offsite and off time at low cost (Kuhne and Quigley 1997). On the other hand, traditional ABA practice requires two or more human annotators to observe, measure, and code the various dimensions of the target behavior on-site (annotators can measure behaviors by reviewing the recordings if video recording is permitted). The annotators are required to take notes of all incidents or environmental cues that occur immediately prior to (antecedents) and immediate after (consequences) the target behavior occurs (Trump et al. 2020). Based on the collected data, the behavior analyst would then be able to manually map out patterns of occurrence and functional relationship between a particular antecedent, behavior and consequence. Behavior modification by manipulating variables that exert direct influence on the problem behaviors then becomes possible. Compared to the behavior observation and analysis practices introduced in traditional teacher training,

ABA is considered labor-intensive and costly, and therefore infeasible to be employed by mainstream teachers in mainstream classrooms (Cooper et al. 2020).

In addition to the labor intensiveness of its application, studies revealed that prior experiences and out-of-profession knowledge disciplines could be major barriers for cross-disciplinary knowledge and skills acquisition, application, accommodation in experienced teachers. This could lead to strong hesitation in mainstream teachers in applying ABA in mainstream teaching practices. Unlike novice teachers who are more open to new experiences since they have less classroom experiences, the prior experiences of experienced teachers could both add value and act as a barrier to professional development. On one hand, prior experiences provide teachers a sense of security about the possible consequences of similar practices (Juma et al. 2017). On the other hand, prior experiences, both successful and unsuccessful, are likely to hold teachers back from learning and trying new skills. Teachers whose current teaching practices are deemed successful may have weaker motivation to improve their existing practices (Haug 2017). Teachers who had unsuccessful teaching experiences of a similar nature may hesitate to try similar practices in different ways. Therefore, successful on-the-job training for experienced teachers requires teachers to be openminded to possibilities, be reflective, and make good use of, without devaluing, their existing teaching practice repertoire for further innovative teaching practice development (Cooc 2019).

2 Adapting Applied Behavior Analysis in Mainstream Teaching Practice

The existing teacher training programmes on special education generally share a drawback of not being able to address the needs of teachers, students, and the particular school's operation and culture (Cooc 2019). Without a doubt, teachers have to take an active role in performing mutual adaptation between the newly acquired and the existing knowledge and skills. To facilitate teachers taking an active role in their learning and adaptation process to address their various unique needs, self-directed learning (SDL) is an approach that emphasizes lifelong learning skill. SDL enables experienced learners to be self-motivated to maximise the use of and enhance one's existing knowledge and skills, while incorporating those newly acquired to develop their professional working theory and practices to address the needs of various stakeholders in the everyday dynamic working environment (De Floria 2016).

At school, teaching–learning dynamics in a mainstream classroom are influenced by the school culture, learning needs of students, teacher–student ratio, individual teaching style, and prior experiences (Florian and Black-Hawkins 2011). When no size fits all, a cohesive whole that caters to all stakeholders' needs can only be achieved by teachers working in the involved context who have a thorough understanding of everything in it. Although there is extensive research in investigating the conducive factors such as attitudes, beliefs, and support in facilitating SDL in academic settings, little research has been undertaken to investigate how to equip and motivate experienced teachers to engage themselves in SDL at the workplace (Juma et al. 2017; Husbands and Pearce 2012).

3 Self-Directed Learning in Self-Organised Learning Environments

SDL is an approach that focuses on the active role of the learner in knowledge exploration, who has ownership over what to learn, how to learn, and when to learn (Brockett and Hiemstra 1991). Studies indicated two major characteristics of SDL: learners take personal responsibility for their learning, and the learning process often involves interactions with the teacher and other learners rather than learning by oneself (Brockett and Hiemstra 1991). Particularly, effective SDL takes place within a social context involving peer dynamics which creates multi-dimensional learning: learning emerges and knowledge is constructed through discussion and reflecting on multiple perspectives (Hiemstra and Brockett 1994). To engage oneself in SDL, one must develop motivation or inner drive for learning. According to studies on cognitive psychology, one's learning motive is strongest when one experiences cognitive dissonance between their existing knowledge and new information; this leads the learner to develop a craving for confirming information and closing the cognitive gap (Harmon-Jones 2019).

At school, managing children's problem behaviors is commonly reported as a recurring and unresolved issue and problem in daily operation (Haug 2017). The problem is recurrent and unresolved because teachers' existing knowledge and skills in nature fail to, or insufficiently, address the challenges, and needs emerge from the student-teacher dynamics that change from minute-to-minute (Mintz and Wyse 2015). The existing discipline of education emphasizes understanding of human development and learning within a context in correlational term. In contrast, the experimental nature of the discipline of science explains observable phenomenon in terms of causal relationship, which allows one to predict and produce observable changes in variables such as behaviors by systematic manipulation of related variables. To enhance the efficiency and effectiveness of existing practices in tackling problem behaviors, teachers must develop an acute awareness and skills in identifying the specific root cause, rather than in correlational terms, of the problem behavior. To do so, they must open up themselves to knowledge and skills of any disciplines, not limited to education, that can compensate the existing knowledge and skill deficits within themselves as well as within the field. Existing new knowledge and skills integration does not occur automatically and must be supported by experienced others in a safe and resourceful environment, both practically and mentally (Hiemstra and Brockett 1994).

Self-organized learning environment (SOLE) is a concept which suggests that learners can learn at their own pace and in their own ways if tangible support such as materials, equipment, and mentors and intangible support such as a non-judgemental and open-minded environment are accessible and guaranteed (Mitra and Dangwal 2010). In a SOLE, learners are consciously aware of the existing and accessible resources within and outside oneself. They are empowered to testify to their assumptions, learn from trial and error, and discuss their learning, in order to lead to deeper learning (Lee et al. 2015). Studies on distance learning suggest that solely providing self-access learning materials is far from sufficient and effective for SDL. The component of teacher–student interaction that facilitates reflection and deep learning in learners should be included and considered as equally important and essential in facilitating effective learning (Kicken et al. 2008).

4 Role of Mentors in Facilitating SDL in SOLE

To facilitate SDL in learners in SOLEs, a mentor is expected to create the condition where learning can occur and guide the knowledge-discovery within the learner (Van Lier 1996). The backbone of the mentor–mentee interaction in SDL of this study is Vygotsky's concept of scaffolding, which suggests that learning can be promoted to the next achievable level by interacting with the mentor (De Floria 2016). To facilitate SDL in SOLEs, the guidance provided by the mentor should be descriptive-led, rather than prescriptive-led, in which timely support and relevant resources are provided for learners to make their own decisions with their judgement for knowledge exploration and skill acquisition (Dickinson 1995). It is reasonable to assume that their decisions of what to learn and how to learn reflect their preferred ways of learning and are the most adaptive ways for them to integrate new learning into their existing repertoire of knowledge and skills, with full consideration of the specific needs in their working contexts.

In this study, an experienced teacher was introduced to ABA and practiced the skills with the support of a behavior analyst in a local mainstream school in Hong Kong. The study aims to explore how experienced teachers can adapt ABA into their existing mainstream teaching practice repertoire.

5 Methods

This study adopted case study as the methodology to explore how an experienced teacher incorporated experimental-oriented ABA approach in her traditional mainstream classroom practices. Case study is a research strategy that focuses on empirical inquiry towards a phenomenon within its real-life context (Yin 2003). It is based on an in-depth investigation with holistic descriptive and exploratory analysis of an individual, group or event, to explore the dynamics of a phenomenon. Case study was chosen for this study to present a teacher's journey of developing her own 'working theory' in integrating the newly acquired and out-of-profession knowledge and skills into her existing mainstream teaching practices in managing problem behaviors. This study will investigate 1) conditions that facilitate cross-disciplinary knowledge and skills integration at the workplace; 2) how to effectively unfold self-directed learning (SDL) in a self-organized learning environment (SOLE); 3) the role of mentorship in vocational training; and 4) conducive factors for the development of a personal working theory at the workplace.

6 Participants

A local Hong Kong mainstream kindergarten was recruited through open recruitment to participate in the study. The kindergarten has been established in the community for over 23 years. There were 14 full-time registered teachers who all received their teacher training in Hong Kong. The years of teaching experience of these teachers ranged from seven to over 20 years.

Amongst the 14 teachers at the kindergarten, a class teacher (T) with over 10 years teaching experiences volunteered to participate in the study. She was a class teacher of

a class with 23 children aged 5–6 years old. In her class there was one child with problem behaviors who received no behavior intervention, and two children with language problems who received regular training by speech therapists.

The principal (P) of the kindergarten graduated from a teacher training programme in hong kong and had engaged in early childhood education more than 20 years. As a managerial personnel, she collected teachers' views about their needs for professional development and had arranged a number of trainings to enhance teachers' capabilities in supporting children with special needs at school.

An ABA therapist who has over 10 years of clinical experience in providing behavior analysis and intervention to young children was recruited through open recruitment in a local child development centre. In this study, she served as the mentor (M) who provided on-site guidance for the mentee from collecting and analysing data to designing data-driven intervention and evaluation.

A five-year-old boy (C) had attended the kindergarten for three years and was described by his class teacher as having problem behaviors including self-stimulating and being maladaptive in group settings at the kindergarten. His maladaptive behaviors in school and home were of concern to the kindergarten personnel and his parents.

7 Procedure

The study was implemented in three stages: the observation and introductory stage, the training stage, and the post-training stage. In the observation and introductory stage, the mentor (M) introduced key concepts of behavior analysis to the teacher (T), the mentee. The mentor observed and explained to the teacher all the classroom dynamics during the specific activity routines when deviant behaviors occurred in high frequencies and intensity. In the training stage, the mentor guided the teacher on identifying the functional relationship between variables and delivering data-driven interventions in the classroom. The training processes in all stages were video-recorded exclusively for training purposes. In the post-training stage, the mentor observed the frequencies and intensity of the targeted deviant behavior, which was the same behavior being observed in the observation and introductory stage during the same activity routine.

Semi-structured interviews with the mentor, teacher, and principal were conducted prior to the study and in each of the three stages to explore the role and functions of a mentor in supporting SDL in a teacher, and the conducive conditions in the learning environment that facilitate the emergence and sustainability of SDL in the teacher, and the maximization of the mentee's potentials. The interview was audio-recorded and transcribed verbatim to identify themes for analysis and discussion. The transcribed data and analyses were presented to the participants for their verification and elaboration. Consent of the school staff, mentor, teacher, and parents of the concerned child and those of children in same classroom were obtained and informed about the purpose of the study and their right of withdrawal.

8 Results

8.1 Limitations of Existing Teacher Training Programmes in Supporting Children with Special Educational Needs

The kindergarten principal shared her disappointment and difficulties in trying to equip staff with knowledge and skills in supporting special needs practically and feasibly at her school.

> *"We tried to invite outside professionals to provide training at school. However, the training was not effective because these services were usually a single workshop on a non-school day when there were no children at school, rather than in-class training. Also, each student's case is different. We need on-going on-site support to tell our teachers what to do and how to do it for the particular child in the particular classroom at the particular moment. Unfortunately, the only way we can get such an ideal service is hiring our own school-based trainer, which is not feasible." (P, 4 March 2020)*

The teacher also shared similar dissatisfaction with the decontextualized training provided by outsiders, which she described as insensitive to the children's unique needs and the operational needs in her classroom.

> *"These invited trainers provide us with some very general knowledge and some case sharing. But these cases do not happen in the same way in our school… The one-off workshop cannot provide us… with very specific and concrete solutions to my problems at hand." (T, 4 March 2020)*

Furthermore, the teacher suggested that the On-site Pre-school Rehabilitation Services (OPRS), which provided on-site training to the child at school, did not help her develop professional skills and knowledge on how to support the students.

> *"These trainers usually deliver one-on-one training in a separate room where we cannot see what they are doing. Also, these trainers are recruited to support the children but not the teachers… their verbal report about what they have done with the child has no practical value on my professional development." (T, 4 March 2020)*

The above narratives indicated that both the teacher and principal were keen to have more comprehensive school-based skill training and were frustrated that the existing training failed to address their school's specific needs. Their eagerness and frustration inevitably increased their motivation to learn and explore all possibilities that could enhance the school staff's capabilities in supporting children with special needs.

8.2 Imparting Applied Behavior Analysis Skills to the Teacher

The ABA therapist, who served as a mentor to the kindergarten teacher, expressed her concerns about the teacher's available skills. She began to introduce ABA skills that the teacher was not taught in prior training.

"The teacher shared with me that out-of-seat behavior bothers her the most. She relied on her memory and impression about the seriousness of the problem, which are unscientific and unreliable observations. This week, I showed the teacher how I observed and measured the concerning behavior. The data made her understand the critical factors that intensified and elicited the concerning behavior. At first, the teacher simply nodded to whatever I said. But later in the week, she asked more specific questions about how to remove the stimulus (factor) that elicits the (target) behavior" (M, 6 March 2020)

Although there were reassuring messages from the mentor, the teacher gave discouraging comments about the training by the end of the first week. The teacher expressed doubt about the training's effectiveness and also her frustration about the advice provided by the mentor.

"My mentor taught me how to collect data and plot graphs. To be honest, I really have no time to do this paperwork. She gave examples about ignoring deviant behavior. However, if the child is being disruptive to the class, how can I ignore it? Reprimand is also considered as attention-giving behavior. The rest of the children may believe that there will be no consequences for being naughty. You can imagine how chaotic the class will be. She also advised me to give the child a mild level of attention if I can see him improve but not yet to my expectation. But if I praised not-up-to-standard behavior, what might the rest of the class think?" (T, 8 March 2020)

In the second week of training, the teacher reported that the mentor did not give her specific advice, which she had wanted and expected from the mentor. The mentor simply outlined the ABA principles and asked her to try alternative ways to create a clear difference between how she engages with the child's appropriate and inappropriate behaviors.

"It is very difficult to praise the child immediately when he sits nicely and listens well while I am teaching a group of children… I first tried only ignoring undesirable behaviors, but this did not work for me. Then, I tried praising appropriate behaviors more to magnify the different consequences brought by performing appropriate and undesirable behaviors. I found myself being more comfortable with giving praise to appropriate behaviors than ignoring out-of-seat behavior." (T, 13 March 2020)

The above narratives illustrated that the teacher tried to balance the classroom's operational needs with the mentor's guidelines. While she was initially reluctant to follow the mentor's advice, she later began to explore and develop her own ways to distinguish her responses and strategies when dealing with different behaviors, as suggested by the mentor. The teacher demonstrated a trial-and-error learning loop, which she continued until she found the technique most suited to her own teaching style and needs.

The narratives also indicated that the teacher was capable of expanding her existing knowledge to include another unfamiliar discipline in analysing a classroom phenomenon. While novice teachers possess less classroom experiences and therefore may not be able to identify the shared grounds across incidents and disciplines, experienced

teachers with more classroom experience are more likely to identify and integrate the new skills to their existing knowledge repertoire.

8.3 The Mentor's Role in Facilitating the Teacher's Self-Directed Learning

The teacher admitted that the mentor's guidance on data collection and precise analysis with timely, on-spot feedback was crucial in helping her filter out less influential factors such as peers' attention and focus on the most critical factors such as teacher's attention in improving the out-of-seat behaviors. The teacher also expressed that reviewing the video recording allowed her to reflect on her practices. More importantly, she had a chance to discuss with the mentor about the reasons that led to particular decisions.

> *"The mentor understood why I refrained from giving attention at moments that the mentor called 'critical moments'. It was important for the mentor to know that I am aware of these 'moments'… she encouraged me to brainstorm every way to create different consequences, which made me aware of all the possible options available to me during those 'moments'". (T, 13 March 2020)*

The above narratives illustrated that the role and function of the mentor were never as a knowledge transmitter. Rather, the mentor was the inspirer who heightened the teacher's awareness of existing resources and other strategies she could consider utilizing in class. The mentor provided practice opportunities, timely feedback and emotional support that empowered the teacher to learn, grow, and develop her own practices in managing behavior problems in class.

> *"Today, the teacher seemed to have developed her rhythm of teaching with new skills included…her application is now smoother, natural, and integrated… The help that she needs is obviously different from before. She now relies more on exploring and maximising existing resources within herself while being consciously aware that I and the principal are available to offer support. I guess trust played a very important role in helping the teacher relax." (M, 21 March 2020)*

The narratives illustrated how the mentor adheres to the principles of SDL and SOLE in facilitating SDL in the teacher in a SOLE. In the SDL process, the teacher was empowered to actively explore knowledge and skills with high autonomy regarding what to learn, how to learn, and when to learn. The teacher was encouraged to take full personal responsibility for her learning with the support of on-site dialogic interactions between the mentor and the teacher about the concerned case if required rather than only learning by oneself. To increase the learning motivation and enhance learning ownership in the teacher, the mentor made the teacher aware of the cognitive gap and learning motivation regarding behavior management by giving the teacher descriptive rather than prescriptive ABA behavior management guidelines. For example, if teacher's attention has been identified as the most influential factor in intensifying the magnitude and frequencies of the child's both positive and problem behavior, the descriptive guideline would be the teacher is suggested to make a good use of the reinforcer, namely teacher's attention, to bring desirable changes in her classroom instead of providing specific instructions about

how and when to use the reinforce to change which behavior. Guideline with descriptive in nature helped the teacher to identify the gaps between what's known and unknown, and required her to come up with her practices without violating the given guidelines.

8.4 Emergence of the Teacher's Working Theory

The teacher expressed her satisfaction with her performance in addressing various operational needs in her classroom and further elaborated on the development of her working theory in supporting children with special needs in the past few weeks.

> *"My working theory is knowing the gist of the skills and believing in your gut feeling…The learning process was full of frustration and pain. But after knowing the mechanisms of the skills, I tried to apply them in a different scenario at a different time for the particular child. Nobody can tell me when to intervene, because the dynamics and the child's behaviors in the classroom change from second to second. It was I who can feel the best moment to apply the skill." (T, 21 March 2020)*

A month after the training, P shared her observation about the changes in the teacher's practices in managing challenging behaviors in class.

> *"The teacher is now obviously more confident in trying out ideas that are supported with evidence. You hear less "I feel" and more "the data shows" from her. She can now very confidently share with us what went wrong with her current approach when dealing with the child's challenging behaviors and what the possible solutions are… She knows I and the team are supportive and open to all options." (P, 26 April 2020)*

8.5 Conditions that Facilitated Self-Directed Learning in a Self-Organized Learning Environment

Interview with the applied behavior analyst revealed the conditions in this school that were conducive to promoting need-sensitive professional development. Notably, an open and supportive culture in the school was particularly crucial in facilitating risk-taking and a culture of open discussion that allow teachers to develop their own style of practices in supporting diversities at school.

> *"Being present in the classroom before the training starts not only allows me to be familiarised with the teacher and the target child, but also allows the child to be familiarised with my presence. The school is very open to different views and is very willing to support any measures that could help improve the current situation." (M, 6 March 2020)*

The teacher expressed that a supportive environment and trusting relationships with the mentor and with her supervisor were crucial in helping her accept challenges, overcome discomfort, and continue her exploratory learning journey.

"The mentor was familiarised with the school culture and operation. I had over a week to communicate my needs and difficulties to the mentor. Without these conditions, I likely would not agree to be watched for so long. I trusted the mentor and my supervisor won't blame me if I fail to improve the child's behavior… I felt I was learning and growing." (T, 13 March 2020)

The narratives shows that besides creating the conditions to engage the teacher in SDL, the mentor and principal created the ideal SOLE for the teacher wherein she learnt at her own pace and in her own ways with timely support from the mentor in a non-judgemental and open-minded environment. In this SOLE, the teacher was consciously aware of the existing and accessible resources within and outside herself. She was encouraged and empowered to test out her assumptions, learn through trial and error, and discuss her learning with the mentor, which led to more effective and deeper learning. The mentor-mentee interaction that facilitates reflection and deep learning in the teacher was the key to successful SDL learning in the SOLE, which facilitated the emergence of the teacher's working theory that addressed the various needs in the teacher's working context. The emergence process was characterised by existing repertoire recognition and integration of new skills. The mentor made herself accessible by giving clear guidelines and expectations while encouraging the teacher to use her own approach to meet the expectations without violating the guidelines. Although the mentor had no specific plan or intention to engage the teacher in SDL and create a SOLE, her mentoring style echoed perfectly with the SDL principle of driving learning autonomy in learners and providing a supportive SOLE characterised by human interactions and full accessibility to intellectual and emotional support.

9 Discussion

This study illustrated that the learners integrated and applied cross disciplinary knowledge and skills effectively in their workplace by unfolding SDL and developing their own working theory in a supportive SOLE. The findings highlighted a unique and need-sensitive working theory that requires the learners to engage themselves in the SDL process in an open learning environment characterized by timely, accessible, and relevant intellectual and emotional support, wherein the learners are empowered to explore or strengthen the knowledge and skills of their interests in their own way and at their own pace.

9.1 Unfolding Self-Directed Learning in Experienced Practitioners in Vocational Training

When facing cognitive dissonance, learners have a strong awareness of the gap between their existing knowledge and the new information (Brockett and Hiemstra 1991). It is particularly difficult for experienced practitioners to articulate what goes wrong with their existing practices that have been working so well in their career. Since the existing standard teacher training on reflection on one's practice that mainly focuses on correlation identification rather than causal relationship between factors. This study revealed

that teachers lack exposure to teaching profession knowledge and skills that are related to their profession and address their needs. The experienced and need-sensitive mentor provided guidance for the mentee to identify where and how to start, adjust, and enhance their professional development to tackle the challenges effectively at both personal and operational levels in their working contexts (Lent et al. 2017). The mentor provided intellectual support within this context to guide the experienced practitioners to identify the interconnectedness between the discipline and the cognitive gap that occur between their existing knowledge repertoire and the newly acquired knowledge. This drives the mentees to develop their working theory by integrating, applying and accommodating the newly constructed knowledge and skills to address the unique needs of their involved context.

9.2 Facilitating Self-Directed Learning in Self-Organized Learning Environments

While all individuals have the potential for SDL, competence and confidence to engage oneself in SDL do not occur in a vacuum (Mitra and Dangwal 2010). SDL competence develops within a resourceful and supportive SOLE that is characterised by accessible and relevant resources and non-judgemental interpersonal relationships (Mitra and Dangwal 2010). Relevant resources include intellectual resources and timely feedback provided through dialogue and conversations. Through dialogue and discussion of the concerned cases, the existing resources and deficits in the mentee can be brought to his or her conscious awareness (Chan 2013). With timely intellectual support, instead of being transmitted by the mentor, the new knowledge and skills are to be integrated adaptively into the existing repertoire by learners who develop their own working theory to address their unique needs at their unique workplace.

9.3 Role of Mentorship in Vocational Training

Mentors who can effectively facilitate the emergence of SDL in learners do not merely share their experiences, knowledge and skills, but also provide descriptive guided skills instead of prescriptive guided skills (Dickinson 1995). Rather than giving step-by-step instructions, the mentor provides descriptive guidelines that allow the mentee to make good use of his or her existing resources to meet the expected outcome without violating the guidelines provided by the mentor.

In this study, the mentor had a thorough understanding of the problem that the mentee encountered, and the learning that the teacher wishes to enrich and further develop. The existing support measure such as On-site Pre-school Rehabilitation Services (OPRS) employed by local kindergartens involve external trainers who usually visit the schools regularly, but are unfamiliar with the school culture and have not established a close working relationship with the teachers. With this, kindergartens with OPRS are suggested to establish rapport and mentorship culture with the trainers. Throughout the mentoring process, the mentor monitored the mentee's learning by regularly meeting and providing relevant skill training and support for the mentee that would enable her to explore her preferred way of learning. The mentor empowered the mentee to improve her pedagogical practices by identifying the existing resources, at both personal and school

levels, by reflecting on what she learned from the case and the challenges she encountered. Throughout the mentoring process, the mentee engaged in a role as a learner and researcher who reflected on her search for knowledge and skill deficits, and researched better solutions to address the concerned problems (Pantić and Florian 2015).

9.4 Emergence of "My Working Theory" in a Self-Organized Learning Environment

In traditional educational settings, teachers receive directives and follow guidelines from higher authorities (Chan 2013). They are rarely encouraged and/or given opportunities to apply innovative practices derived from their own knowledge, experiences, and skills to solve problems they encounter in the classroom (Chan 2013). In this study, the teacher had not been instructed about how to include the labor-intensive and costly ABA approach in her current practice. Rather, the mentor and school administrator facilitated the integration by creating a SOLE with an open, non-judgmental, and resourceful environment for the teacher, guiding her to reflect on current practices. This scaffolding support is delivered on site to ensure teachers are clear about the available and accessible resources at various points promptly (Dickson 1995). Throughout the study, re-evaluation of one's assets is an on-going process. All decisions are realistic, attainable and sensitive to the contextual needs including those of oneself, to empower teachers to challenge themselves for professional development. The development of a working theory in experienced practitioners lies in the dynamics of SDL in a SOLE in which the learner's existing knowledge and skills are fully recognised and the autonomy of how to integrate the new skills into existing skills is fully granted and respected, with timely feedback in an intellectually-rich and emotionally-supportive environment.

10 Implications

The most effective practices address the various needs of children and teachers within a context constructed by the teachers. Despite the challenges and concerns expressed by mentors, mentees, and school management, which can be part of their professional growth, these findings have five important implications on the reform of teacher training, professional development in practical means, and the establishment of an organisational learning culture.

First, teacher training providers should consider abandoning the traditional distinction between mainstream teacher training and special education teacher training. Given diversity is the norm in modern societies, teacher training should be an integral programme that encompasses both disciplines.

Second, cross-disciplinary learning, out-of-teaching-profession knowledge and skills acquisition should be encouraged in teacher training programmes. In this study, equipping the teacher with experimental explorative skills enabled the teacher to identify a causal relationship as opposed to a relational relationship that is emphasized in traditional teacher training. Instead of giving a general statement about whether a behavior problem can be improved, the current systematic manipulation and measurement of

changes in variables can lead to irrefutable specific conclusions about "what to", "where to", "how to", and "how do I" solve the behavior problem and to what extent.

Cross-disciplinary knowledge and skill application would inevitably facilitate innovative practices in the involved field. Innovative teaching practices do not necessarily mean invention. Rather, it involves expanding existing teaching knowledge and skills repertoire by integrating knowledge and skills from other disciplines to cater to the needs of the stakeholders of the school, which is both innovative and adaptive. For instance, studies on behavior management indicated that application of artificial intelligence in collecting and analysing data of problem behaviors can effectively enhance quality of classroom management and curriculum design in mainstream classrooms in a labor and cost effective way (LeBlanc et al. 2016). Teachers are therefore strongly recommended to explore development of other disciplines and apply relevant knowledge and skills adaptively to improve the quality of education services to children.

Third, the sustainability of SDL must be supported by an SOLE that is intellectually and emotionally supportive. The knowledge and skills that are needed by learners are the results of the reciprocal dynamics between the learner and the involved context. Whether learners' SDL can be sustained and learning can be transformed to practices that address their unique needs in the involved context depends on whether learners are capable of developing their working theory at the personal and professional level (Kuhne and Quigley 1997). After all, professional teachers should see themselves as life-long professional learners who are skilful enough to formulate their best practices that address the ever changing dynamics in classroom and school settings (Sagor 1992).

Fourth, mentors in vocational training should possess the skills of providing descriptive instead of prescriptive guidelines, to empower mentees to explore and map out their way of learning and solutions, and enhancing learners' awareness of the available and accessible resources within and outside oneself. All existing and new knowledge that new learners attain should be acknowledged and respected.

Fifth, an organisational learning culture should have full consideration of and support for the development of teachers' own teaching styles. Considering teachers are the ones who have the best knowledge about the needs of their own classroom operation and students, personalised pedagogy and practices should be encouraged and considered as assets in catering to the unique needs of children, teachers and schools.

11 Limitations

Since the participants in this study were recruited on a voluntary basis, it is reasonable to assume they had considerably stronger motivation to learn than if the participants were recruited randomly. The traditional practice of ABA measures changes to the specific aspects of identified behavior in accordance to the changes to the specific aspects of the individuals' engaged environment. This practice is a highly intensive intervention which usually only involves the trainer and a few participants. The present study only involves the learning journey of one teacher with the mentor and school personnel in managing one child's problem behavior, and therefore cannot be generalized to other contexts. However, the meaningful clinical findings provide significant insights and directions on how to improve the existing practices in question (Alnahdi 2013). Further studies could

focus on cross-disciplinary collaboration for kindergarten teacher training to enhance teachers' awareness for cross-disciplinary learning. Also, school cultures that support the development of SOLE for career-long professional and collaborative learning can be further explored.

12 Conclusions

The COVID-19 pandemic has transformed various aspects of everyone's lives. Amid the pandemic, teachers took up the role of teacher, counsellor and therapist in supporting children's and their families' various needs brought by the pandemic (Yoshikawa et al. 2020). Training included in traditional teacher training programs can no longer satisfy the demands of the rapidly changing world. Professional teachers should be sensitive to the needs in their profession and equip themselves with the most updated and relevant skills to meet the demands. On-the-job training for experienced practitioners should strike the balance between respecting existing knowledge and skills and integrating new but related knowledge and skills with high degree of practicality and feasibility. Trainers or mentors must have a thorough understanding of the multiple aspects of mentees and their working context, in order to provide practical and feasible descriptive guidance to mentees. The school organization should provide an intellectually and emotionally supportive environment to ensure the staff are encouraged and empowered to explore the potentials within and resources outside themselves, and help them develop their own working theories to address the specific needs that occur in their particular working contexts.

Appendix

Sample of Interview questions
To mentor

- Please describe your beliefs and strategies in supporting a mentee in school settings.
- Please share your prior experiences in mentoring experienced teachers in school settings.
- Please share your experiences in supporting mentee in this study.

To mentee

- Please share your experiences about teacher training or professional development in the area of supporting children with special educational needs.
- Please share your experiences in supporting children with special educational needs.
- Please describe your school working culture and your needs in this working environment.
- Please share your learning experiences under the mentor's guidance and support.

To principal

- Please describe your school management philosophies. How would you develop your staff at school?
- Please share your views about the availability and suitability of the existing teacher training programs/ workshops in addressing the needs of your school.
- (To both principal and mentee) Have you been introduced/ used experimental approach in curriculum planning and classroom/ school management? If yes, please share your experiences. If not, please describe your understanding about this approach and your expectations about its application in your classroom/school operation.

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Optimizing Digital Learning Experiences

The Effect of Peer Collaboration on Students' Regression Modelling Ability Within a Technology-Enriched Environment

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Abstract. Socio-cultural theories of learning argue that peer collaboration facilitates student learning. To justify the applicability of the theories, an experimental study was conducted to address the question of whether peer collaboration would affect students' performance of regression modelling tasks. Fifty-eight students were randomly assigned to groups A, B, or C. There were four stages in the study; students in groups A and B were allowed to have peer discussions about the workflow of a regression modelling in Stages I and III respectively, whereas students in Group C worked on their own in both stages. In Stage II or IV, all students in these three groups attempted the questions individually. It was found that peer collaboration might improve students' performance of regression modelling tasks involving model assessment and statistical significance and interpretation of regression estimates, but not the straight-forward tasks of Excel programming, R^2 (regression heuristics) reporting, and model selection.

Keywords: Collaborative interaction · Pre-task discussion · Post-task discussion · Regression modelling · Vocational education

1 Introduction

Irrespective of how much effort has been put into enhancing statistics teaching and learning through various pedagogical approaches or technology (e.g., Pfannkuch and Budgett 2016; Wild et al. 2015), numerous research articles (e.g., Dunn et al. 2016; Schau et al. 2012) have reported that Statistics is not well grasped by many students. It seems that the teaching and learning of statistics calls less attention to equipping students with adequate statistical knowledge and skills to utilize appropriate statistical methods and tools; and to reasoning and interpreting statistical results. Both reasoning and interpretation demand higher-order thinking that would be better by having more inputs from students for consolidation to form intellectual resources for appreciating each other's viewpoint so that lines of reasoning or statistical interpretations can be constructed, refined or revised. This

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collaborative learning approach follows socio-cultural perspective of learning developed by Vygotsky (1978). From this perspective, scholars like Brown (2005), Nussbaum et al. (2009), as well as Zavershneva and van der Veer (2018) argued that students would make thinking explicit so that peers can read and respond. This is sort of co-construction of knowledge, learning thus becomes more meaningful.

The experimental study reported here was motivated by the need to understand how and to what extent students improve their statistical thinking and reasoning associated with regression modelling under the influence of peer collaboration within a technology-enriched environment. Apart from using technology as to enable students to have a more intuitive feel for the concepts being studied; to alleviate students' computational burden; and to allow students to implement computer logic, technology is known as a tool for sharing knowledge, as being contextualized by Geiger (2014) as student-centered orchestrations supporting social processes of learning. For instance, students would have discussions when reading a screen display as being visible products of problem solving in mathematics learning.

2 Literature Review

Research studies (e.g., Goos 2004; Li 2015; Li and Goos 2017; Nussbaum et al. 2009) are relevant to the theme of the present study. Goos (2004) discussed how a community of inquiry was established in a mathematics classroom within a technology-enriched environment in which a teacher initiated discussions by inviting students to respond or answer. The students presented their own beliefs, ideas, or arguments and raised questions, thus generating a more comprehensive view of learning contexts. The teacher listened to the flow of discussions; he consolidated students' inputs, rectified their flaws or underpinned their knowledge. Apparently, the community of enquiry was established from peer collaboration and social interaction among students as well as between students and a teacher.

In Li and Goos' study (2017), students in a statistics classroom were divided into small groups in order to increase students' opportunities for peer collaboration. A questionnaire-based survey was to solicit feedback from them after small-group learning. The survey findings showed that the importance of learning partners, social interaction, collaborative learning, the significance of teacher's intervention, and teacher's scaffolding assistance were potential factors influencing social processes of statistics learning within an IT environment. Both studies shed light on socio-cultural theories of learning in two similar classroom contexts.

On the other hand, Nussbaum et al. (2009) argued that peer collaboration did not arise by just putting students in group learning but needing to foster environment that they would engage with learning. The argument was evident from Li (2015) as well as Li and Goos (2018); both reported that students within small groups interacted among themselves and collaborated on solutions to statistical problems. Successful collaborations were arisen from teacher's intervention in the way that promoting social interactions and moderating discussions. Nevertheless, none of the above studies testifies whether peer collaboration would improve student learning using an experimental approach in the way that contrasting student performance between those with peer collaboration and those without such collaboration.

3 Collaborative Learning

The students (aged 19–22) in the present study were enrolled in the second year of a 3-year Higher Diploma in Applied Statistics and Computing (HDASC) course. The HDASC course was offered by a vocational college in Hong Kong, China to equip students with statistical knowledge and skills ready for job employment after graduation. They all had successfully completed secondary education and had attained the elementary level of probabilistic and statistical concepts in their Year 1 study. That is, they should be able to: analyse data using tools like statistical graphs, tables, summary statistics, and hypothesis testing; quantify uncertainty of an event; use probabilistic reasoning in justifying statistical findings and statements; and present statistical results and findings.

To judge the applicability of socio-cultural theories of learning, the HDASC students were divided into small collaborating groups in order to increase students' opportunities for peer learning and collaboration. Students within each of these groups were expected to work together in and after their classes. In order to reduce the extent of academic variability among collaborating groups, a consideration was given to ability compositions in groups. Thus, a less competent student was grouped with a more competent peer. These groups become more homogeneous in terms of students' academic abilities on the basis of their grade point averages achieved in their Year 1 Study. This would enable a more competent student to assist his or her less competent learning partner, thus creating the necessary conditions for observing whether or not peer assistance might be beneficial for students' learning.

The students were taught topic of regression modelling by a teacher (the first author of this paper) in a lecture theatre and a computing laboratory. Each collaborating group of students naturally sat together when attending a class held in a lecture theatre where the teacher led class discussions toward developing an understanding of regression topics. Sometimes, students helped their groupmates to answer questions raised by the teacher. In the computing laboratory, students needed to accomplish learning tasks. The tasks were designed to promote an exchange of views, sharing of knowledge and resolution of problems that should cultivate a higher level of involvement within a collaborating group. For instance, a collaborating group would determine how to perform statistical tasks and program Excel. It was anticipated that students would gain from collaboration and subsequently develop strategies of problem solving so as ultimately to have better statistical achievement. However, to what extent students improve their statistical thinking and reasoning associated with regression modelling under the influence of peer collaboration within a technology-enriched environment is not clearly known, thus demanding an experimental study.

4 Experimental Study

An experimental study consisting of a test was conducted in the computing laboratory because the research participants ought to use computers to access the data secured and managed by a computer server. Also, the test environment is more or less the same as the settings of their regular computing laboratory sessions in which they needed to use Excel

to accomplish their learning tasks. As such, this would reduce the chance of response variability owing to unfamiliar test environment or settings.

4.1 Research Participants

The fifty-eight HDSAC students voluntarily participated in this experimental study. They were randomly assigned to one of these three experimental conditions, pre-task discussion, post-task discussion or no discussion. The groups who had discussion with their groupmate(s) either right at the beginning of the test (i.e., pre-task discussion) or in the middle of the test (i.e., post-task discussion) were classified as groups A and B respectively. Individual students who had worked on their own in the entire test period were in group C. As four students were absent from this test, the total number of students participating in this test became 54. Of these 54 students, 22, 13, and 19 were in groups, A, B, and C respectively.

4.2 Experimental Instrument

A test was designed to assess how the students present logical lines of reasoning in the context of regression modelling when making links among concepts, inferential results, as well as evidence, and used to gather experimental data. Six questions were set in a test paper, together with a description of the real-life data (y = the number of rooms in high tariff hotels occupied, x_1= the number of visitor arrivals from Japan, x_2= the number of visitor arrivals from South East Asia, x_3= the number of visitor arrivals from the USA, x_4= the number of visitor arrivals from West Europe, and x_5= the number of visitor arrivals from Australia and New Zealand). The business context of data selected for the research participants were appropriate the capabilities of individual participants.

Questions 1–3 and Questions 4–6 were arranged as in the fundamental stage and the intermediate stage of regression modelling respectively. Specifically, Question 1 was to assess students' knowledge of model construction using Excel. Question 2 was used to evaluate how well students would conduct R^2 (regression heuristics) computations. Question 3 was used to check how well students justified model fitting using the tool, R^2. These three questions are about Excel programming and reading Excel results. Question 4 focused on an appraisal of students' evaluation of model significance. Question 5 checked how well students conducted statistical hypothesis testing and reasoned with testing results. Question 6 aimed at assessing students' ability to deduce its practical implications.

4.3 Experimental Procedure

There were four stages in this experimental study. In Stage I, all students could spend 10 min to read a set of data with real-life context from computers either on a group (i.e., students in group A) or an individual basis (i.e., students in groups B and C). But only group A was allowed to have peer interaction within each collaborating group, during which time they could initiate discussions and generate questions associated with measurement, measurement units, content and context of the data. The discussions

about valuing appropriate and reliable data would set out lay of the land of evidence when presenting regression findings in Questions 4 – 6. In Stage II, all students in these three groups could spend 20 min to attempt the first three questions individually. Two students of these two groups, A and C were absent from the test.

In Stage III, all students could spend 10 min to read a set of data with real-life context from computers either on a group (i.e., students in group B) or an individual basis (i.e., students in groups A and C). But group B was allowed to have peer interaction within each group, and during this time the students could share what, how, and why they had attempted in the first three questions so as to refine their thoughts; mediate between their conflicting views and promote their individual understanding. In Stage IV, all students in these three groups could spend 20 min to attempt the last three questions individually.

5 Results

The students' responses to each test question were compared among these three groups: A (students had pre-task discussion), B (students had post-task discussion), and C (students had no discussion at all).

5.1 Test in Stages I and II

This test consisted of two stages, Stages I and II. In Stage I, only students of group A were allowed to study a given set of data in terms of its context, measurements, and measurement units collaboratively with their groupmate, but not students of groups B and C. In Stage II, all students of these three groups attempted Questions 1–3 on an individual basis.

Students' Ability to Build Regression Models Using Excel Regression Tools (Question 1)

Question 1 asked the students: (a) to build five regression models using Excel regression tools; (b) to read the regression output (e.g., Fig. 1) as being visible products of regression modelling; and (c) to report a mathematical relationship between a dependent variable (y) and an independent variable (x_i) for each of the five models they had built, namely, $y = \beta_0 + \beta_1 x_i$, $i = 1, 2, 3, 4, 5$. Twenty-one (95.5%), twelve (92.3%), and nineteen (100%) students in groups A, B, and C respectively used the tools to accomplish tasks of inputting data correctly (i.e., y for a dependent variable and x_1–$x_5$for five independent variables) and reporting the regression models in terms of the estimates of β_0 (intercept) and β_1 (slope) (see the red numbers in Fig. 1). Students of group C (100%) exhibited a slightly higher proportion of building regression models using the Excel tools, whereas one student of group A reported regression results of the first two regression models correctly but leaving the last three models unattempted and one student of group B gave wrong regression estimates probably because of misreading Excel results. They read Excel output in which they checked regression estimates of β_o and β_1 and the significance testing results corresponding to the estimates. One student of group C further illustrated the best model fitting using a graph of y against both observed and predicted values of x.

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.84121712
R Square	0.70764625
Adjusted R Square	0.70403694
Standard Error	628.868935
Observations	83

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	77537686.4	77537686.4	196.0616052	2.4469E-23
Residual	81	32033567.2	395476.138		
Total	82	109571254			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	13259.8316	196.099908	67.6177348	5.01112E-73	12869.6543	13650.01	12869.65	13650.01
X1	0.04155956	0.00296807	14.0022	2.44689E-23	0.03565402	0.047465	0.035654	0.047465

Fig. 1. Regression output

Students' Responses to Reading the Regression Heuristics, R^2 (Question 2)
All (100%) students in groups A, B, and C reported R^2 correctly (refer to the blue figures in Fig. 1) that indicated how well the data fitted a regression model. The R^2 is sort of regression heuristics for making comparisons of the model fitness among various models so as to select the best-fitting model just like what the students attempted this question. Irrespective of whether or not having pre-task discussion, there is no difference in students' responses. They accomplished these tasks efficiently because they became proficient at building regression models in their practice sessions.

Students' Proficiency of Using the Regression Heuristics, R^2 (Question 3)
Table 1 presents the quality of students' responses to selecting the regression model best for making prediction with the aid of the tool, R^2. Eleven (50.0%), five (38.5%), and six (31.6%) students of groups A, B, and C respectively provided correct answers together with justification; they compared the model fitting among the five models using R^2 and decided to choose the model with the largest R^2. In addition to giving justification, 18.2%, 23.1%, and 36.8% of students in these three respective groups did even better as providing elaborations in terms of the model importance and/or the model implication; one (5.3%) student of group C gave a substantiation by means of statistical graphing. The student decoded observed and predicted values of x on the graph and compared the discrepancies between these two values. On the other hand, 27.3%, 38.5%, and 26.4% students of groups A, B, and C underperformed like relating to wrong data labels, incorrect interpretation of R^2, or justification with improper descriptive. Only one (5.3%) student of group A did not complete the task.

Overall speaking, there is no apparent effect of peer collaboration on students' regression modelling performance of the first three relatively straight-forward tasks. First, a slightly higher proportion (100.0% versus either 95.5% or 92.3%) of students in group C (no discussion) than students in group A (pre-task discussion) and group B (post-task discussion) correctly used Excel tools to build five regression models and demonstrated

Table 1. Students' evaluation of model fitting (Question 3)

Response categories	Frequency		
	Group A* N = 22	Group B* N = 13	Group C* N = 19
Correct tools with justification	50.0%	38.5%	31.6%
Correct tool with justification, together with model importance and/or model implication	18.2%	23.1%	36.8%
Correct tool with justification, together with further substantiation using statistical graphing	0.0%	0.0%	5.3%
Correct tool with justification, interpretation of R^2, and contrast with smaller R^2	0.0%	7.7%	0.0%
Correct tool with justification but wrong interpretation of regression heuristics tool, R^2	0.0%	7.7%	0.0%
Correct tool with justification but using improper descriptive	27.3%	7.7%	21.1%
Correct tool but reporting imprecise p-value	0.0%	7.7%	0.0%
Correct tools with justification but relating to wrong data label or misreading p-value	0.0%	7.7%	5.3%
Incomplete answers	4.5%	0.0%	0.0%

Note.
*Groups of students who had discussion with their group member(s) either right at the beginning of the test or in the middle of test were classified as groups A and B respectively. Individual students who had worked on their own in the entire test period were in group C.

high ability in reading regression results. Second, all (100%) students in groups A, B, and C did well in Question 2, they reported R^2 accurately and used it properly to select the best-fitting model among the five models they built in the previous task. Third, 73.7% of students in group C provided correct answers together with justifications for selecting the best-fitting model. This proportion was just slightly higher than students of the other two groups, i.e., 68.2% and 69.3% of students in group A or group B respectively (see Table 1).

5.2 Test in Stages III and IV

The test contained two stages, Stages III and IV. In Stage III, only students of group B were allowed to discuss with their groupmate(s) but not students of the other two groups. In Stage IV, all students of groups A and C attempted Questions 4–6 on an individual basis. Stages III and IV asked students to attempt more sophisticated tasks.

Students' Ability of Checking the Model Significance (Question 4)
Table 2 indicates the quality of students' responses to hypothesizing about the significant model they built; 45.5%, 84.6%, and 26.3% of students in groups A, B, and C respectively

could evaluate the model significance correctly (see the green figures in Fig. 1) and used the assessment results to generate statistical evidence in association with a claim about the model being feasible for making predictions. Besides, 4.5% and 5.3% of students in groups A and C gave interpretation of the results in addition to justification. Some of the students adopted an approach that was reliant on *t-statistics* rather than using *F-statistics*, although both approaches are equivalent to checking the significance of a simple linear regression model. In addition, only one student in each of these two groups A and C gave an interpretation of the results as an explicit argument in defence of the model fitting.

There are also imperfections in students' responses; 13.6% and 36.8% of groups A and C conducted correct statistical hypothesis testing but providing improper interpretations and/or implications. Four (18.2%), two (15.4%), and six (31.6%) of students in groups A, B, and C respectively conducted incorrect hypothesis testing. The incorrect testing arose from the students who had conducted testing in accordance with wrong formulation of statistical hypotheses, i.e., H_0: $\beta_0 = 0$ versus H_1: $\beta_0 \neq 0$. These two viable hypotheses are to merely check the significance of a regression intercept rather than a model significance. In group A, 9.1% of students did not complete the task or did not attempt the task.

Table 2. Students' performance of hypothesis testing about the model significance *(Question 4)*

Response categories	Frequency		
	Group A* N = 22	Group B* N = 13	Group C* N = 19
Correct testing with justification	45.5%	84.6%	26.3%
Correct testing with justification and interpretation	4.5%	0.0%	5.3%
Correct testing but improper interpretation and/or implication	13.6%	0.0%	36.8%
Incorrect testing	18.2%	15.4%	31.6%
Incomplete testing	9.1%	0.0%	0.0%
Unattempted	9.1%	0.0%	0.0%

Note.
*Groups of students who had discussion with their group member(s) either right at the beginning of the test or in the middle of test were classified as groups A and B respectively. Individual students who had worked on their own in the entire test period were in group C.

To sum up, 84.6% of students in group B (with post-task discussion) exhibited the highest proportion (versus either 50.0% or 31.6% of students in groups A and C) of providing correct and thorough answers after assessing the fit of a regression model ($y = \beta_o + \beta_1 x_i$, $i = 1, 2, 3, 4, 5$). Among these three groups, 15.4% of students in group B (with post-task discussion) exhibited the lowest proportion (versus either 50.0% or 68.4% of students in groups A and C) of providing worse answers such as those improper interpretations, flawed implications, incorrect testing, or incomplete testing. Perhaps,

students with post-task discussion (group B) within groups might have benefited from having discussions about the first three tasks that acquire logical reasoning, especially when assessing and comparing the model fittings among the five models.

Students' Ability of Conducting Hypothesis Testing About β_0 (Question 5i)
Students' responses were checked about how logical lines of reasoning on statistical evidence were constructed. As can be seen in Table 3, a higher proportion (46.2% versus either 40.9% or 26.3%) of students in group B than students in groups A and C accomplished the tasks of conducting the hypothesis testing. First, they formulated statistical hypotheses (H_1: $\beta_0 = 0$ versus H_1: $\beta_0 \neq 0$) correctly. Second, they used proper inferential tools. Third, they managed *p-value* to grade the strength of statistical evidence correctly (refer to the purple figures in Fig. 1). Last but not least, they gave an interpretation of and/or a deduction from testing results. Group A had the highest proportion (40.9% versus 23.1% and 36.8% of students in groups B and C) conducted hypothesis testing correctly, although neither interpretation nor deduction was provided after conducting hypothesis testing.

Table 3. Students' performance of hypothesis testing about β_0 (Question 5i)

Response categories	Frequency		
	Group A* N = 22	Group B* N = 13	Group C* N = 19
Correct testing with justification, interpretation, and/or deduction	40.9%	46.2%	26.3%
Correct testing with justification but without interpretation	40.9%	23.1%	36.8%
Correct testing but reporting wrong p-value	0.0%	15.4%	0.0%
Correct testing but wrong interpretation	4.5%	0.0%	0.0%
Correct testing with contradictory interpretation	0.0%	7.7%	5.3%
Incorrect testing	9.1%	0.0%	10.5%
Incomplete testing	0.0%	7.7%	15.8%
Unattempted	4.5%	0.0%	5.3%

Note.
*Groups of students who had discussion with their group member(s) either right at the beginning of the test or in the middle of test were classified as groups A and B respectively. Individual students who had worked on their own in the entire test period were in group C.

Nevertheless, some students' flaws were found; two (15.4%) students in group B did correct testing but reporting a wrong *p-value*. One student (4.5%) in group A gave a wrong interpretation. Only one student in groups B and C gave a contradictory interpretation that arose from illogical reasoning like written text against the null hypothesis H_o. One (7.7%) and three (15.8%) students in groups B and C did not complete the testing respectively; one just stated two hypotheses, H_0 and H_1 and some skipped to compare *p-value* with

α. Two (9.1%) and two (10.5%) students in groups A and C did hypothesis incorrectly; some conducted a testing about β_1 instead of β_0. Some students made a comparison between *p-value* and R^2 that is a wrong decision rule for rejecting H_0. They could not manage *p-value* to grade the extent to which H_0 would be rejected. Furthermore, one (4.5%) and two (10.5%) students in groups A and C did not attempt the inferential task.

To summarize, the students who might actively engaged either in pre-task (group A) or post-task discussion (group B) performed better than students of group C who had no discussion at all. Some students who had pre-task discussion about measurement, measurement units, content and context of the data had jotted down some notes on their test papers how to build regression models using Excel. Some students who were engaged with post-task discussion had written on their test papers about the workflow of inferential tasks on which they would anticipate to work. Most of their writings were for examining the strength of statistical evidence. Seemingly, students in group C had worse inferential capability than students in group A or group B like providing a wrong *p-value*, a wrong or contradictory interpretation, incorrect or incomplete testing, or doing nothing.

Students' Ability of Conducting Hypothesis Testing About β_1 (Question 5ii)

The quality of students' responses to conducting hypothesis testing about a regression slope (β_1) is presented in Table 4 which reveals 31.8%, 15.4%, and 15.8% of students in groups A, B, and C respectively critically evaluated the *p-value* in connection with H_o and showed that a significant regression slope (β_1) was associated with statistical evidence (*p-value*), together some with an interpretation the meaning of the regression estimate of β_1 relating to the context and measurement units of data or the implication of rejecting H_o. Students of group A (who had pre-task discussion) exhibited the highest proportion of conducting hypothesis testing successfully than both groups B (post-task discussion) and C (no discussion at all). It is also worth noting that 31.8%, 15.4%, and 31.6% of students in groups A, B, and C respectively conducted hypothesis testing correct but did not give any interpretation.

On the contrary, the inferential work done by 36.4%, 69.2%, and 52.6% of students in groups A, B, and C was of inferior quality that would discredit lines of reasoning about the significance of β_1. Three (13.6%), four (30.8%), and three (15.8%) of students in the three respective groups reported an imprecise *p-value* as a statistical evidence; two students (15.4%) of group B reported a wrong *p-value.* Only one student (5.3%) of group C gave a contradictory interpretation showing a mismatch between statistical significance and a conclusion; two (9.1%) and one (7.7%) of students in groups A and B gave a wrong interpretation. Incorrect hypothesis testing was found in both groups A and C; the *p-value* used by the students was not to contrast with α (the preset level of statistical significance) but with R^2 or β_1, thus being unable to form a basis for rejecting H_o. Some simply stated R^2 and the estimate of β_1. One student misread the *p-value* as reporting the value associated with a variable not in the testing context. In addition, only one student of group C mixed up these two statistical tools, confidence interval versus hypothesis testing, although both could serve the purpose of statistical inference to a certain extent. Both groups B and C (7.7% versus 15.8%) had given incomplete inferential work as they did not give a sound justification of statistical evidence; they

Table 4. Students' performance of hypothesis testing about β_1 (Question 5ii)

Response categories	Frequency		
	Group A* N = 22	Group B* N = 13	Group C* N = 19
Correct testing with justification, interpretation, and/or deduction	31.8%	15.4%	15.8%
Correct testing with justification but without interpretation	31.8%	15.4%	31.6%
Correct testing but reporting imprecise p-value	13.6%	30.8%	15.8%
Correct testing but reporting wrong p-value	0.0%	15.4%	0.0%
Correct testing with contradictory interpretation	0.0%	7.7%	5.3%
Correct testing but wrong interpretation	9.1%	7.7%	0.0%
Incorrect testing	4.5%	0.0%	10.5%
Incomplete testing	0.0%	7.7%	15.8%
Unattempted	9.1%	0.0%	5.3%

Note.
*Groups of students who had discussion with their group member(s) either right at the beginning of the test or in the middle of test were classified as groups A and B respectively. Individual students who had worked on their own in the entire test period were in group C.

simply stated the two hypotheses or the regression model; or merely reported the *p-value* of model testing. Two (9.1%) and one (5.3%) of students in groups A and C did not attempt this inferential task.

Students' Proficiency of Interpreting the Meanings of Regression Estimates of β_0 and β_1 (Question 6)

Table 5 shows that 69.2% of students in group B gave a correct and complete interpretation of the regression estimates of β_o and β_1 (refer to the red figures in Fig. 1) in relation to the context and measurement units of data, compared with 54.5% and 52.6% of students in groups A and C. In group A, only one student of group A elucidated the practical usage of β_o and its implication. Students of group B (with post-task discussion) outperformed both groups A and C the tasks of interpreting the meaning of regression estimates. It seems that post-task discussion might be beneficial to students' interpretation of β_o and β_1.

Although 18.2%, 15.4%, and 15.8% of students in groups A, B, and C had given interpretation of the estimates of β_0 and/or β_1, their interpretations did not make any connections between the data context and/or numerical quantity of the estimates and one student of group A gave an unconcise interpretation. Two (9.1%), one (7.7%), and two (10.5%) of students in these three respective groups could interpret either β_0 or β_1, but not both. Only 7.7% and 5.3% of students in groups B and C respectively gave a wrong interpretation of β_o and β_1 on the basis of the *p-values* rather than using the estimate

Table 5. Students' performance of interpreting the meanings of regression estimates of β_0 and β_1 (Question 6)

Response categories	Frequency		
	Group A* N = 22	Group B* N = 13	Group C* N = 19
Correct interpretation	50.0%	69.2%	52.6%
Correct interpretation with β_0 elaboration	4.5%	0.0%	0.0%
Correct interpretation but unconcise	4.5%	0.0%	0.0%
Correct interpretation of β_o and/or β_1 but without relating to data context and/or numerical quantity of data	18.2%	15.4%	15.8%
Incomplete interpretation (Correct interpretation of either β_o or β_1 but not both)	9.1%	7.7%	10.5%
Wrong interpretation as only reporting the estimates of β_o and β_1	0.0%	7.7%	5.3%
Unattempted	13.6%	0.0%	15.8%

Note.
*Groups of students who had discussion with their group member(s) either right at the beginning of the test or in the middle of test were classified as groups A and B respectively. Individual students who had worked on their own in the entire test period were in group C.

of β_1. In addition, 13.6% and 15.8% of students in groups A and C respectively did not attempt this question.

6 Conclusion

Irrespective of whether or not having discussion, almost all students performed the tasks of Excel programming well and completely reporting the regression models they had built (Question 1). In addition, all (100%) students reported the R^2 (regression heuristics) correctly (Question 2) and used it properly to select the best-fitting model among the previous models. A slightly higher proportion (73.7% versus either 68.2% or 69.3%) of students in group C (no discussion) than students in group A (pre-task discussion) and group B (post-task discussion) provided correct answers together with justifications for selecting the best-fitting model (Question 3). The effect of peer collaboration on students' performance in the fundamental stage of regression modelling is not evident.

When advancing in the next stage of regression modelling to attempt more sophisticated tasks, the influence of peer collaboration on students' performance became apparent. With post-task discussion, group B outperformed both groups A and C the tasks of providing correct and thorough answers after assessing the fit of a regression model (Question 4); conducting the hypothesis testing about H_0: $\beta_o = 0$ versus H_1: $\beta_o \neq 0$ (Question 5i); and interpreting the meaning of regression estimates (Question 6). Perhaps, students with post-task discussion within groups might have benefited from having discussions about the first three tasks that acquire logical reasoning. Some students who

were engaged with post-task discussion had written on their test papers about the workflow of inferential tasks on which they would anticipate to work. Most of their writings were for examining the strength of statistical evidence.

Nevertheless, the students who engaged in pre-task did better in testing about H_0: $\beta_1 = 0$ versus H_1: $\beta_1 \neq 0$ than both groups B and C (Question 5ii). Interestingly, both Question 5i and 5ii asked students to attempt similar tasks. Some students who had pre-task discussion about measurement, measurement units, content and context of the data had jotted down some notes on their test papers saying how to build regression models using Excel. After participating in pre-task discussion, students also had meaningful gains in statistical hypothesis testing performance when attempting Question 5ii).

The students who engaged either in pre-task (group A) or post-task discussion (group B) performed better than students of group C who had no discussion at all, although discussions were held in different stages of the test. Group A had discussion right at the beginning of the test (i.e., Stage I), whereas group B had discussion the middle of the test (i.e., Stage III) respectively. The influence of either pre-task or post-task discussion on the further steps of model building was more explicit in accomplishing the last three tasks (Questions 4 – 6). Correct and complete responses to these three questions required broader knowledge and deeper thinking for the tasks of reasoning about data and reasoning about results. The reasoning tasks demanded for making sense of the data connecting with their contexts.

Peer collaboration might not arise by just asking students to work together in small groups, so the above findings held an implicit assumption of student participants being actively engaged either in pre-task or post-task discussion. As a matter of fact, the assumption was valid based on the following two situations. Firstly, two observation studies conducted in the same classroom by the authors of this paper (Li and Goos 2018; Li and Goos 2022) revealed that the student participants got used to small-group learning in a computing laboratory where peer collaboration were evident from the contexts of their verbal exchanges. Secondly, the text of regression tactics they had put down on their test papers showed their joint effort.

The implications for classroom teaching and learning derived from the empirical findings are that teachers should be responsive in resolving group conflicts if discussions reach an impasse. Teachers also need to utilize class time effectively, and more time should be allocated to students for group discussions when attempting sophisticated tasks or solving difficult problems.

The overall findings of how students benefited from peer collaboration were consistent with socio-cultural theory of Vygotsky (1978) in which knowledge construction necessarily promotes different ways of thinking and incorporates different perspectives of their peers. Through peer collaboration, verbal exchanges between the students either in pre-task discussion or post-task discussion might have a rich thinking context but how the discussions structured their thought is not known because of the collaborative learning episodes not being audiotaped or videotaped. As such, it is recommended to conduct

another experimental study during which students' verbal speech and their social interaction when doing regression tasks at computers, are videotaped at the same time. Analyzing the videotaped data should provide an account of how students' development of thinking benefit from their verbal exchanges and social interaction in a technology-enriched environment.

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The Impact of COVID-19 Pandemic on Higher Education: Reshaping Workplace Learning and Assessment (WLA) After COVID-19

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Abstract. The COVID-19 pandemic has accelerated many changes in educational innovations within the higher education sector. Among these changes, Workplace Learning and Assessment (WLA) is also affected as a structured pedagogical approach newly initiated by the Vocational Training Council (VTC) in Hong Kong. Grounded in the successful launch of WLA in different engineering programmes and the valuable experience, closer collaboration between the VTC and the employers for sustainable workforce development has been achieved. A tripartite platform has been established to enable competency-based learning and assessment with the participation of the VTC, employers, and trainees. However, as observed, recovery from the COVID-19 pandemic has been slow. To improve, tracking surveys with statistical data analysis (including descriptive statistics and ANOVA: two-factor without replication) and qualitative data were conducted to collect feedback from all the employers and trainees in the programmes on the implementation of WLA and the web-based assessment system with and without significant impacts of the pandemic aiming at shedding light on undiscovered dimensions of lagging growth prior to, during, and coming out of the pandemic. Meanwhile, this research also examines what might be done to revive the WLA development in the months and years ahead, and what lessons the Hong Kong experience may have for other places which would have a similar situation. For example, the VTC has established a robust quality assurance mechanism to govern WLA implementation, including the assessment workflow and the nomination of workplace trainers, verifiers, and assessors. A web-based assessment system has been devised to facilitate trainees and employers in conducting WLA. Moreover, a series of WLA engagement activities will be formulated to adopt a more targeted approach in the publicity on WLA in VTC.

Keywords: COVID-19 · Workplace learning and assessment · Vocational and professional education and training · Higher education

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1 Introduction

Workplace Learning and Assessment (WLA) is a structured pedagogical approach newly initiated by the Vocational Training Council (VTC) in Hong Kong. It aims to nurture skilled talent capable of performing up to occupational and industry standards leading to vocational qualifications, by integrating the school-based and work-based learning components in programmes. By launching this initiative, closer collaboration between the VTC and the employers for sustainable manpower development can be achieved. The Hong Kong government is also strongly supporting this initiative by introducing the Pilot Incentive Scheme to Employers to encourage employers to join hands with the VTC to develop and implement structured WLA activities.

In the VTC, "Workplace Learning and Assessment" is a structured pedagogical practice where education is integrated into the work setting, and trainees' competence is assessed in an authentic workplace. WLA enables the integration of the school-based and work-based learning components in academic programmes, and becomes part of the curriculum requirement to enhance trainee learning motivation. Academic programmes can therefore keep abreast of the latest industry developments. Through the structured workplace assessment activities, employers can have a clear picture of the trainees' competence. The training activities can be fine-tuned based on the trainees' assessment results to enhance their performance.

2 Literature Review

2.1 International Practices of WLA

To develop a WLA system to suit the local applied education environment, the VTC has made reference to the internationally recognized practices over the world, for example, the dual-track vocational education and training (VET) systems in Germany and Switzerland, and the workplace learning and assessment system in New Zealand.

The dual-track VET system in Germany is a systematic integration of the merits of training in a company and education in a vocational school. It aims to strongly facilitate a successful transition of young people from school to work and to guarantee a skilled workforce underpinning a successful economy (Fürstenau et al. 2014). Over the course of two (2) to four (4) years, trainees spend a couple of days a week, or even blocks of several weeks at a time, at a vocational school where they acquire theoretical knowledge. At the same time, they gain practical knowledge and hands-on experience in a company or public sector institution (Hockenos 2018). Trainees' competence is assessed both in the school and the workplace. Employers and industry practitioners play a critical part in the delivery of workplace training and assessment design (Hoeckel and Schwartz 2010). The graduates are qualified as skilled workers after passing the examination and this qualification is recognized throughout the country. Each year about two-thirds of them manage to secure full-time employment from the same training firms upon graduation. The graduates can also articulate with bachelor or even master degrees in universities of applied sciences or other post-secondary institutes (Legislative Council Secretariat Research Office 2015).

In Switzerland, the dual-track VET system is also predominant. The majority of the young people commence vocational education and training after the lower-secondary level. Trainees will have practical training (apprenticeship) on three to four days at a training company, and the training is supplemented by theoretical classes on one to two days at a vocational school (FOC 2021). Similar to the German dual VET system, workplace is one of the settings where trainees' competence is assessed through on-the-job assessment (Hoeckel et al. 2009). Trainees can concentrate on their profession after graduation. They can also reach successive higher levels of education through extra training. The federal vocational baccalaureate allows trainees to study for a bachelor's degree at applied universities (SWI swissinfo.ch 2020).

Not only do European countries, such as Germany and Switzerland place emphases on the workplace in vocational training and education, New Zealand has also established a well-structured WLA system. The WLA model in New Zealand is also characterised by the mixture of on-the-job training and off-the-job training, where the former takes place in a company and the latter is conducted at a polytechnic or a technical college, so as to maximise the benefits of the complementarity between school-based and work-based learning. In this connection, assessment will be arranged in the polytechnic and/or workplace (Vaughan and Cameron 2009). The structured provision of WLA in New Zealand is arranged and managed by the Industry Training Organizations (ITOs) that are recognised by the Associate Minister of Education (Tertiary Education) (New Zealand Qualifications Authority 2021). ITOs work with industries to develop assessment materials, including the unit standards. A unit standard describes what a trainee who has achieved the standard knows and can do. Each standard has a defined credit value, which reflects the level of complexity of the skills and knowledge that are recognized by the standard. To gain credits for a unit standard, trainees have to demonstrate that they are competent. Workplace assessors play a key role in supporting learners throughout the training and assessment processes. There is a systematic registration system of assessors in New Zealand.

2.2 WLA in VTC Context

To launch the WLA initiative in the Vocational and Professional Education and Training (VPET) in Hong Kong, the VTC has made reference to the international best practice of the dual-track systems and the WLA model. Trainees study part-time at the VTC while they receive apprenticeship training at the companies they work for at the same time. The VTC collaborated with the employers to develop WLA activities that are widely practicable in the industry. The Government is also strongly supporting this initiative by introducing the Pilot Incentive Scheme to Employers to encourage employers to join hands with the VTC to develop and implement structured WLA activities for particular industries. Participating employers will receive a subsidy in conducting WLA.

Referencing the best practice of the German and Swiss dual-track vocational and education systems which have been internationally recognized, and the well-established WLA model adopted in New Zealand, the VTC has developed its own WLA system to suit the local applied education environment. In accomplishing this, the VTC has cooperated with employers in developing unit standards and assessment tasks for assessing trainees' competence against the employers' requirements. Not least is the programme curricula

enhancement which can be attained by incorporating the latest skills, knowledge and technologies required by the industry.

To nurture a highly skilled workforce, the VTC has taken a leap forward to develop a unique WLA system by referring to the international best practice. The VTC has cooperated with employers in developing unit standards and assessment tasks for assessing trainees' competence against the employers' requirements. A tripartite platform is therefore established to enable competency-based learning and assessment with the participation of the VTC, employers, and trainees. The Engineering Discipline of the Hong Kong Institute of Vocational Education (IVE) of the VTC has developed WLA elements for its Higher Diploma (HD) programmes and Diploma of Foundation Studies (DFS) programmes. The programme curricula are enriched by incorporating the latest skills, knowledge, and technologies required by the industry.

2.3 Conceptual and Analytical Approach

In the early 1900s, Taylor (1911) and Thorndike (1918) provided the foundation for competency-based education that significantly changed American society. Since then, Competency-based Training (CBT) is a popular curriculum development model in social services training and is a highly effective training approach, particularly when the curriculum can be specified and sequenced. Reference was made to the local (e.g. the Specification of Competency Standards (SCS) in Hong Kong) and international standards (e.g. unit standards in New Zealand). After that, unit standards and other assessment materials, including trainee assessment records and assessor guides were drafted. Unit standards reflect the competency requirements of particular tasks and the expected outcomes trainees have to demonstrate. Trainee assessment records contain all the assessment tasks that trainees are required to perform to meet the required outcomes of the unit standards. These records also provide instructions on what and how the evidence is to be collected and presented, and the assessment requirements and conditions to be met. Trainee assessment records also serve as evidence records to document the progress, results and the verifier/assessor's feedback on the assessment tasks/activities. Assessor guides provide the assessor with the structure of the assessment, the type of evidence required and how it should be collected and judged.

A tacking survey gathers data effectively and provides an opportunity to compare yearly results. In this research, the feedback covers employers and trainees who are the key stakeholder in the tripartite cooperation together with VTC. The data collected can act as a key indicator of the deficiency of support to trainee and employer, and is a good reflection on what resource can be re-allocated in the future planning. Data of the two consecutive years (2020 and 2021) fell in the period of the COVID-19 and can estimate the impact of COVID-19 through this indirect feedback. This indirect feedback approach is effectively to collect stakeholders' views and examines the trend and differences across the years.

In the analysis part, the study explored the different ways that engineering students and employers experience WLA based on the Kirkpatrick (1976) model. Participated engineering students and employers with various learning and assessment experiences were interviewed using two surveys. In theoretical framework, the Kirkpatrick model was adopted as an appropriate approach to the evaluation of training in organizations

consisting four levels of training outcomes: reaction, learning, behavior, and results (Bates 2004). Reaction was originally used to describe how much participants liked a particular training program and the term evolves along with time to assess trainees' affective responses to the quality (e.g., satisfaction with instructor) or the relevance of training (e.g., work-related utility). Learning measures are quantifiable indicators of the learning that has taken place during the training typologies. Behavior outcomes address either the extent to which knowledge and skills gained in training are applied on the job or result in exceptional job-related performance. Results are intended to provide some measure of the impact that training has had on broader organizational goals and objectives.

3 Research Questions

Tracking surveys involving key stakeholders (i.e. trainees and employers) have been conducted since 2020. By gathering the data and feedback of the two major parties involved in the assessment in 2020 and in 2021, the information collected revealed the perception of students and employers under the Covid-19 pandemic on WLA in Hong Kong. In view of the above backdrops, we would like to explore the following issues or questions based on literature and best practices:

- What challenges have employers and students encountered during the implementation of WLA during the COVID-19 pandemic?
- What policies and initiatives have been taken in VTC to overcome the above impacts?

4 Changing Nature of WLA Implementation by the Pandemic

4.1 Method: Tacking Surveys Involving Relevant Stakeholders

The pandemic is profoundly affecting lives. Isolation and contact restrictions imposed a remarkable change to the implementation of WLA. In the surveys, qualitative data were also collected to study the respondents' views. Table 1, 2, 3 and 4 depict the question statements with average ratings for trainees and employers in the tracking surveys conducted in year 2020 and year 2021 on WLA implementation and WLA web-based assessment system.

Tracking surveys involving relevant stakeholders (i.e. trainees and employers) have been conducted in 2020 and 2021. Questionnaires on "WLA Implementation" and "Web-based Assessment System" with 7 and 8 core questions respectively were conducted to collect the feedback from all the 30 employers and all the 104 trainees. In the survey, the employers and trainees were invited to rate different aspects related to the implementation of WLA and the web-based assessment system on a 5-point Likert scale. Rating of '1' denotes that the respondent strongly disagrees with the given statement whereas a rating of '5' denotes that the respondent strongly agrees with the given statement.

Table 1. Trainees' feedback on WLA implementation

Statements	Average rating in 2020	Average rating in 2021	Δ
There was sufficient time to complete the WLA tasks	3.68	3.35	−0.33
There were sufficient WLA tasks for me	4.51	3.89	−0.62
WLA is helpful for me to understand employer's requirements	3.66	3.28	−0.38
WLA enabled me to identify the areas for improvement	3.62	3.39	−0.23
The VTC teacher provided me with sufficient support when I had WLA	3.78	3.29	−0.49
My employer's feedback on my performance was helpful to my learning	3.69	3.72	0.03
Overall, WLA could enhance my abilities to do my job	3.66	3.58	−0.08

4.2 Analysis of the Results

The tracking surveys' results demonstrated a noticeable impact of the COVID-19 on the WLA implementation and web-based assessment system. By using ANOVA, in which ANOVA is a collection of statistical models and their associated estimation procedures, our team collected data from multiple points in time for repeated measures to assess the effects over time. The F test-statistic and corresponding p-value were showed in appendix according to the AVONA analysis. By collecting data from multiple points in time for each subject, repeated measures designs can assess effects over time.

We evaluated the educational effect of WLA according to the first three levels of Kirkpatrick's model using questionnaires. The first step of the Kirkpatrick program evaluation model is related to the participants' reactions. Thus, in this step, participants' attitudes were evaluated regarding the effect of WLA on their educational outcomes via a questionnaire. In the second level of the Kirkpatrick program evaluation model, the effect of the WLA was evaluated on participants' learning using pre- and post-survey. Accordingly, this questionnaire used before and after COVID-19. In the third level Kirkpatrick program evaluation model, we assessed whether the learning was transformed into practice in the workplace by using observation and focus group discussion.

For trainees' feedback on WLA implementation, the F test-statistic is 12.27 and the corresponding p-value is 0.013. Since this p-value is less than 0.05, we reject the null hypothesis and conclude that there is a statistically significant difference in mean response scores that are based on repeated observations.

Table 2. Trainees' feedback on WLA web-based assessment system

Statements	Average rating in 2020	Average rating in 2021	Δ
The interface of the system is user-friendly	4.02	3.48	−0.54
The interface of the system is clear	3.94	3.48	−0.46
The system functions smoothly	3.99	3.27	−0.72
It is convenient for me to use the system anytime and anywhere	4.02	3.29	−0.73
The system facilitates assessment submissions	3.98	3.44	−0.54
The system enables you to keep a good record of assessment results and the employers' feedback	4.13	3.66	−0.47
VTC has provided adequate training materials and guidance	3.90	3.15	−0.75
Overall, I am satisfied with the system	3.99	3.16	−0.83

For trainees' feedbacks on WLA web-based assessment system, the F test-statistic is 155.21 and the corresponding p-value is 4.94E−06. Since this p-value is less than 0.05, we reject the null hypothesis and conclude that there is a statistically significant difference in mean response scores that are based on repeated observations.

For employers' feedbacks on WLA implementation, the F test-statistic is 25.18 and the corresponding p-value is 0.002. Since this p-value is less than 0.05, we reject the null hypothesis and conclude that there is a statistically significant difference in mean response scores that are based on repeated observations.

For employers' feedbacks on WLA web-based assessment system, The F test-statistic is 10.17 and the corresponding p-value is 0.015. Since this p-value is less than 0.05, we reject the null hypothesis and conclude that there is a statistically significant difference in mean response scores that are based on repeated observations.

4.3 Feedback from the Employers

In the survey, the employers were invited to rate different aspects related to the implementation of WLA and the web-based assessment system on a 5-point Likert scale. Rating of '1' denotes that the respondent strongly disagrees with the given statement whereas a rating of '5' denotes that the respondent strongly agrees with the given statement. Regarding the survey results of the implementation of WLA, 24 out of 30 (80%)

Table 3. Employers' feedback on WLA implementation

Statements	Average rating in 2020	Average rating in 2021	Δ
There was sufficient time to complete the WLA tasks	3.90	3.58	−0.32
There were sufficient WLA tasks for trainees	3.89	3.76	−0.13
WLA was helpful to organize the workplace training in a more structured manner	3.86	3.45	−0.41
The assessment materials facilitated the delivery of workplace assessments	3.78	3.60	−0.18
The performance criteria enabled me to judge the trainee's competence more effectively	3.98	3.46	−0.52
VTC provided me with sufficient support when I conducted workplace assessments	4.34	3.64	−0.70
Overall, WLA was helpful to enhance the trainee's abilities to do the job	3.95	3.61	−0.34

employers returned the questionnaires. Positive feedback was generally given by the respondents with an average rating of 4.0 in the overall satisfaction on the WLA implementation. The average rating given by the respondents on each dimension was close to 4 or even higher than 4. Another questionnaire survey was also conducted to collect the feedback from employers on the WLA web-based assessment system. 23 out of 30 (76.7%) employers returned the questionnaires. In general, employers rated the system positively with an average rating of 4.0 in the overall satisfaction on the WLA web-based assessment system. The average rating given by the employers on each dimension was around 4.

4.4 Feedback from the Trainees

All the trainees had completed the WLA activities in the first year of the programmes. 66 out of 104 (63.5%) trainees responded to the questionnaire on the WLA implementation. As reflected in Table 4, the feedback given by trainees was generally positive with an average rating of 3.8 in the overall satisfaction with the WLA implementation. The average ratings given by the trainees on the other dimensions were around 3.7, except for the aspect of the sufficiency of WLA tasks, which had a rating of 4.5. The trainees commented that WLA had facilitated the enhancement of their practical skills and better

Table 4. Employers' feedback on WLA web-based assessment system

Statements	Average rating in 2020	Average rating in 2021	Δ
The interface of the system is user-friendly	4.09	4.09	0.00
The interface of the system is clear	4.01	4.14	0.13
The system functions smoothly	4.01	4.08	0.07
It is convenient for me to use the system anytime and anywhere	3.85	4.22	0.37
The system facilitates the delivery of workplace assessments	4.05	4.14	0.09
The system enables you to keep a good record of the trainees' performance	3.98	4.20	0.22
VTC has provided adequate training materials and guidance	3.97	4.35	0.38
Overall, I am satisfied with the system	4.08	4.13	0.05

understanding of the employers' requirements. For the survey on the WLA web-based assessment system, 85 out of 104 (81.7%) trainees returned the questionnaires. An average rating of 4.0 was obtained in the overall satisfaction with the WLA web-based assessment system. As revealed in Table 5, the average rating given by the trainees on each dimension was around 4.

Table 5. Mapping of suggestion for improvements with apprentice skills wanted

Suggestion for improvements	Apprentice skills wanted			
	S1: Applying engineering knowledge	S2: Developing technical solutions	S3: Managing engineering work	S4: Upkeeping professional acumen:
Webinars to inspire	✓	✓	✓	✓
Voice to you	✓			✓
Virtual site visit		✓	✓	
Opportunity that support	✓	✓	✓	✓
Route to WLA		✓		✓

4.5 Key Observations

The outbreak of COVID-19 pandemic started back to December 2019 and the pandemic has resulted in many changes in the companies. Activities including ceased promotional visits to companies, less favorable face-to-face promotions to both trainees and employers, social distancing and lockdown orders had caused a negative impact on engagements with both the trainees and employers.

According to the two-way ANOVA with no replicates, the results indicate that there are significant differences between the different time period (i.e. with/without significant impacts of the pandemic) across all the four measures. The result suggests there are statistically significant differences in mean response scores that are based on repeated observations for both trainees and employers for either WLA implementation or web-based assessment system. In order to further identify the interaction, descriptive statistics are examined together with the qualitative data collected in the appendix.

Regarding the results of tracking surveys with and without significant impacts the pandemic, negative satisfaction rates on the WLA implementation and web-based assessment system were generally given by the respondents (i.e. trainees and employers) except a positive trend about employers' feedbacks on WLA web-based assessment system. Average ratings were dropped across trainees' feedbacks on WLA implementation, trainees' feedbacks on WLA web-based assessment system and employers' feedbacks on WLA implementation. To identify the most affected dimensions, the top three negatively changed dimensions in the three measurements (including 1. Trainees' feedbacks on WLA implementation, 2. Trainees' feedbacks on WLA web-based assessment system, and 3. Employers' feedbacks on WLA implementation) and the top three positvely changed dimensions in the measurement (i.e. employers' feedbacks on WLA web-based assessment system) were ranked in order to seek a targeted solution.

In WLA implementation, trainees expressed a negative experience in the period of pandemic. The trainees indicated that there were insufficient WLA tasks for them with limited employers' feedback on their performances that were usually helpful to their learning in the absence of the pandemic. To a certain extent, the circumstantial evidence on the significant effect of increased working from home is compelling. The effects of social distancing and companies' access restrictions may also cause a series of concerns on implementation of WLA. On the other hand, employers commented that a sufficient support was not rendered during the pandemic when they conducted the workplace assessments. Due to restricted chances of explanation in performance criteria for the employers, they found a difficulty in judging the trainees' competence effectively without the support. As a result, the benefits of WLA can be maximized if the workplace training can be organized in a more structured manner after the impacts of pandemic.

In WLA web-based assessment system, the trainees and employers hold opposing views in term of "adequate training materials and guidance provided" and "convenience to use the system anytime and anywhere". Since the last phase of web-based WLA enhancement works focused primarily on the employers' interface, it was understandable that employers showed a positive trend especially on the smooth functioning and the enabler of keeping a good record of the trainees' performance.

Perhaps, the observations reveal that it is important to explain the WLA tasks with employers and trainees in person that these routine activities were restricted to do so in the

period of pandemic. As an alternative, activities that were conducted via the internet, by email or video-conferencing may not necessarily yield the best results. For the exception, a positive trend about employers' feedbacks on WLA web-based assessment system, it is believed that the continuous efforts on web-based WLA enhancements (mainly the employers' interface) should be given a due recognition for the support of employers undisputedly during the pandemic. Moreover, its originally online nature of the system may also experience less disturbance in the pandemic.

With reference to qualitative data, employers commented that it is a "more effective way to use a paperless system instead of paper". From the employers' perspective, some commented that we should "share in advance about the assignment that the apprentices are going to do and key objective of this assignment", in which the pandemic has hindered the explanation works to employers beforehand. The employers also stated that WLA had improved the web-based assessment system with "simple interface" and is now more "convenient to access and record the results". The trainees expressed that the system had enabled them to access the feedback from the verifiers and the assessors more conveniently with a simple and easy-to-use interface which was helpful for them to reflect on their performance. As reflected from the qualitative survey results, the trainers claimed that the WLA had facilitated the enhancement of their practical skills and better understanding of the employers' requirements. However, the trainees also remarked that "more demonstration" and "adequate training before work" can be improved, in which some planned face-to-face trainings were forced to cease due to the pandemic. Both quantitative and qualitative data exhibited a consistent correlation.

The WLA model developed by VTC is a valuable deliverable with the elaboration of the collaboration between the VTC and the industry in the development and implementation of this pedagogy. After the first-year implementation of WLA, both the employers and the trainees generally appreciated the WLA practice. In the future, generic and soft skills, such as language skills, communication skills, and interpersonal skills could incorporate the WLA approach as these types of competence could also be learnt and assessed in the workplace. With the WLA of both the trade-specific and generic skills, trainees' competence could be assessed in a more all-round manner to meet the industry requirements.

5 Reshaping WLA After COVID-19

5.1 Enhancement of Web-Based Assessment System Based on Comments Received

Workplace activities are no longer limited to a bounded office and constraints of periods. Instead, new practices have evolved into an adoption of remote work settings, fluid time constraints and continuous connectivity. As such, the VTC has pioneered a web-based assessment system to facilitate the implementation of WLA among trainees, employers and the VTC. The assessment tasks are constructed on the system with the unit standard and the assessment progress displayed on the interface. On the web-based assessment system, the trainee, verifier and assessor can perform a series of action to complete the WLA tasks. The trainee can complete the assessment tasks online and upload the assessment evidence, such as written reports, photos and videos

which have recorded the competence that the trainee has demonstrated. The verifier will then verify the assessment evidence and provide the feedback online for the trainee. Based on the verification, the assessor can make judgement about the trainee's performance and also give feedback to the trainee on the system. The WLA tasks submission/verification/assessment status is clearly displayed on the platform. After each step is completed, the trainee/verifier/assessor will be notified of the status via email. VTC teachers can also view the submission/verification/assessment status at all times.

With this web-based assessment system, WLA can be conducted without the constraints of place and time. The system also replaces the traditional paper and pen approach to conduct assessment so as to enable a good electronic record of the trainee's learning progress and performance, thereby contributing to effectively build up a learning portfolio for the trainee. In this regard, the areas of improvement of the trainees could be more easily identified which would help analyse the training needs. Moreover, this digital platform can save time from passing the documents among the parties concerned and it is convenient to search for the information required and assessment results. Based on the positive results received from the employers, the enhancements of web-based assessment system should be implemented for the trainees and be extended to the next phrase. The current enhancements of the system include 1) enabling course creation using Moodle, 2) enabling easier enrollment procedures, 3) enhancing Unit Standard setting, 4) Facilitating checklist setting, 5) enabling trainee progress report, and 6) enriching different users' overview.

5.2 Scaffolding Employers' Engagement

Workplaces provide particular kinds of experiences which support student learning in ways which may not be present in other circumstances (Kennedy et al. 2015). Employers are the key stakeholders in WLA. Without them, it is almost impossible to implement WLA. In the future, a series of ongoing promotion activities will be conducted to encourage employer participation in WLA. For instance, promotional materials and videos will be revised to promote WLA highlighting its advantages and the roles of employers in its implementation. Promotion visits in face-to-fact mode to relevant trade associations, training boards and individual companies will also be arranged to introduce WLA and to encourage employers for the nomination of their staff as trainers, verifiers and assessors. Besides, large-scale briefing sessions to employers will be held to provide an interactive platform for them to know more about WLA.

5.3 WLA Engagement Series

Engaged and motivated students are fundamental to successful outcomes of WLA. Unfortunately, the impact of COVID-19 on student engagement in WLA has brought challenges of engaging students in a WLA context. Complemented by strengthened publicity efforts to raise students' awareness and understanding of the value of WLA, we recommend a coherent message in the publicity of WLA that highlights its association with work skills for the future and prospect, with a view to appealing to the younger generation. Some proposed directions to take forward this recommendation are as follows –

a) Theme-based webinars to describe the importance of student engagement and the impact on student outcomes in a WLA context (such as webinars in a WLA context and sharing sessions to facilitate exchanges on best practices between industry partners);
b) Professional development workshops for students by the industry sectors to boost students' understanding of WLA as well as the latest development and manpower trends of different trades and professions;
c) Coordinating exchange, placement opportunities and on-site activities arranged by the industry sectors to provide students with first-hand exposure to training plans;
d) An on-demand consultation service, through online instant massagers or telephone hotlines, to provide information on WLA when necessary.

6 Upholding Quality Assurance of WLA

6.1 Quality Assurance Mechanism

In order to conduct WLA systematically and credibly, VTC has established a robust quality assurance (QA) mechanism to govern WLA development and implementation. The QA measures ensure the validity of the assessment materials, tools, processes, and judgments made to the trainees' performance. It is also a supportive mechanism for continuous improvement of the contents and standards of WLA and the design of the assessment methods and materials. The unit standards developed are required to be reviewed and endorsed by the VTC programme boards before application. Pre-assessment moderation has to be conducted to ensure the WLA materials are fit for purpose and appropriate to the level of credit value of the unit standard. In order to assure the appropriateness of assessment decisions, post-assessment moderation has also to be completed. It aims to verify whether assessment decisions are made according to the performance criteria, and using evidence that is current, valid, accurate, authentic and sufficient. It is also a strategy to provide feedback to the assessors and assessment developers on good practices, and/or make recommendations for continuous improvement.

To ensure the right people to implement WLA, the eligibility of workplace trainers, verifiers, and assessors are required to be accredited by the VTC programme boards. They are nominated by their employers and have to fulfil the requirements relevant to the unit standards. They are required to be holders of the relevant recognized degrees or professional qualifications with relevant experience in the industry. Furthermore, it is necessary for the nominated workplace verifiers and assessors to complete a training workshop offered by the VTC Quality Enhancement and Accreditation Office (QEAO) to equip them with the knowledge and practical skills in delivering WLA. To enable workplace trainers, verifiers and assessors to conduct assessments in the workplace more effectively within the QA framework, the QEAO has provided handbooks for them.

6.2 Assessment Moderation and Feedback

Before the commencement of WLA, pre-assessment moderation was conducted as explained in the earlier section about the QA mechanism. Besides, pre-assessment meetings were held with the trainee, workplace verifier and assessor to ensure they understood

the assessment task, the unit standard and the performance criteria thoroughly before the task was carried out. While the employers were undertaking the WLA task, VTC provided continuous support to them wherever it deemed appropriate. After the assessment, post-assessment moderation was organised to check the consistency of assessment decisions according to the assessment materials and performance criteria, and using evidence that was current, valid, accurate, authentic and sufficient. After the employers had completed the WLA activities with the trainees in the first year of the programmes, questionnaire surveys were conducted to collect the feedback from all the employers in the HD and DFS programmes on the implementation of WLA and the web-based assessment system. Questionnaires were sent to all the trainees who participated in WLA in the HD programmes and the DFS programmes.

7 Conclusion

WLA approach enables trainees to learn and sharpen their skills in the workplace, and acquire industry-recognised competencies, thereby contributing to sustain a well-trained and qualified workforce for our society. Grounded in the successful launch of WLA in different engineering HD and DFS programmes and the valuable experience gained, the VTC has planned to expand the WLA approach to more engineering programmes so as to benefit more trainees and industries. Meanwhile, the VTC is exploring different ways to promote WLA to encourage employer participation.

This paper advances the argument that the nature of WLA implementation has been changed due to the impact of COVID-19. The ANOVA results indicate that there are significant differences between the different time period (i.e. with and without significant impacts of the pandemic) across all the four measures. The result suggests there are statistically significant differences in mean response scores that are based on repeated observations for both trainees and employers for either WLA implementation or web-based assessment system. Positive trends were found for the three measures including 1. Trainees' feedbacks on WLA implementation, 2. Trainees' feedbacks on WLA web-based assessment system, and 3. Employers' feedbacks on WLA implementation, while a negative trend was found for the measure of employers' feedbacks on WLA web-based assessment system. Through more innovative approaches, with a view to raising the trainees' and employers' awareness of the opportunities and prospects made available by WLA, some new proposals (such as WLA Engagement Series) have been made to reshape WLA after COVID-19. Continuous upgrades of the web-based assessment system for both employers and trainees interfaces should be carried out with a noticeable credit earned so far. Engagement of employers and students are inseparable to the success of WLA implementation. Therefore, it is important to reaffirm the support of WLA development by encouraging more stakeholders, including Government departments and industry partners, to adopt this structured pedagogical approach. A proposed WLA Engagement Series, including a) theme-based webinars, b) professional development workshops, c) exchange, placement opportunities and on-site activities, and d) an on-demand consultation service will be taken forward.

8 Way Forward

This paper elaborates on the VTC WLA system, the subsequent quality assurance mechanism, the related engagement activities, the web-based assessment system, and the feedback from employers and trainees. In order to conduct WLA in a systematic and credible manner in the future, the VTC has established a robust quality assurance mechanism to govern WLA implementation, including the assessment workflow and the accreditation of workplace trainers, verifiers and assessors. Meanwhile, a web-based assessment system has been enhanced to facilitate trainees and employers in conducting WLA. With the system, the learning progress of trainees can also be tracked at all times.

Appendix

Descriptive Statistics on WLA implementation (Trainees).

Trainees (2020)		*Trainees (2021)*	
Mean	3.8	Mean	3.5
Standard error	0.119781547	Standard error	0.089176123
Median	3.68	Median	3.39
Mode	3.66	Mode	#N/A
Standard deviation	0.316912186	Standard deviation	0.235937845
Sample variance	0.100433333	Sample variance	0.055666667
Kurtosis	6.457160227	Kurtosis	−0.813122306
Skewness	2.5183556	Skewness	0.814809135
Range	0.89	Range	0.61
Minimum	3.62	Minimum	3.28
Maximum	4.51	Maximum	3.89
Sum	26.6	Sum	24.5
Count	7	Count	7

Descriptive Statistics on WLA implementation (Employers).

Employers (2020)		*Employers (2021)*	
Mean	3.957142857	Mean	3.585714286
Standard error	0.068268179	Standard error	0.040347133
Median	3.9	Median	3.6
Mode	#N/A	Mode	#N/A
Standard deviation	0.180620623	Standard deviation	0.106748481
Sample variance	0.03262381	Sample variance	0.011395238

(*continued*)

(*continued*)

Employers (2020)		*Employers (2021)*	
Kurtosis	4.505230847	Kurtosis	0.065354533
Skewness	1.946880487	Skewness	0.188867361
Range	0.56	Range	0.31
Minimum	3.78	Minimum	3.45
Maximum	4.34	Maximum	3.76
Sum	27.7	Sum	25.1
Count	7	Count	7

Descriptive Statistics on Web-based Assessment System (Trainees).

Trainees (2020)		*Trainees (2021)*	
Mean	3.99625	Mean	3.36625
Standard error	0.023825069	Standard error	0.062960801
Median	3.99	Median	3.365
Mode	4.02	Mode	3.48
Standard deviation	0.067387472	Standard deviation	0.178080038
Sample variance	0.004541071	Sample variance	0.0317125
Kurtosis	2.025896445	Kurtosis	−0.834088057
Skewness	0.837212245	Skewness	0.285705396
Range	0.23	Range	0.51
Minimum	3.9	Minimum	3.15
Maximum	4.13	Maximum	3.66
Sum	31.97	Sum	26.93
Count	8	Count	8

Descriptive Statistics on Web-based Assessment System (Employers).

Employers (2020)		*Employers (2021)*	
Mean	4.005	Mean	4.16875
Standard error	0.026992062	Standard error	0.030962968
Median	4.01	Median	4.14
Mode	4.01	Mode	4.14
Standard deviation	0.076345081	Standard deviation	0.087576497
Sample variance	0.005828571	Sample variance	0.007669643
Kurtosis	1.831898789	Kurtosis	2.042997567

(*continued*)

(*continued*)

Employers (2020)		*Employers (2021)*	
Skewness	−1.136480628	Skewness	1.368662082
Range	0.24	Range	0.27
Minimum	3.85	Minimum	4.08
Maximum	4.09	Maximum	4.35
Sum	32.04	Sum	33.35
Count	8	Count	8

Measure items and ANOVA for trainees' feedbacks on WLA implementation.

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Q1 Sufficient time	2	7.03	3.515	0.05445
Q2 Sufficient tasks	2	8.4	4.2	0.1922
Q3 Understand employer's requirements	2	6.94	3.47	0.0722
Q4 Identify for improvement	2	7.01	3.505	0.02645
Q5 Sufficient support	2	7.07	3.535	0.12005
Q6 Employer's feedback was helpful	2	7.41	3.705	0.00045
Q7 Overall	2	7.24	3.62	0.0032
Trainees (2020)	7	26.6	3.8	0.100433333
Trainees (2021)	7	24.5	3.5	0.055666667

Source of variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.7826	6	0.130433333	5.081818182	0.034210231	4.283865714
Columns	0.315	1	0.315	12.27272727	0.012775833	5.987377607
Error	0.154	6	0.025666667			
Total	1.2516	13				

Measure items and ANOVA for trainees' feedbacks on WLA web-based assessment system.

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Q1 User-friendly interface	2	7.5	3.75	0.1458
Q2 Clear interface	2	7.42	3.71	0.1058
Q3 The system functions smoothly	2	7.26	3.63	0.2592
Q4 Convenient to use	2	7.31	3.655	0.26645
Q5 Facilitate assessment submissions	2	7.42	3.71	0.1458
Q6 Keep good record	2	7.79	3.895	0.11045
Q7 Provided adequate training materials and guidance	2	7.05	3.525	0.28125
Q8 Overall	2	7.15	3.575	0.34445
Trainees (2020)	8	31.97	3.99625	0.004541071
Trainees (2021)	8	26.93	3.36625	0.0317125

Source of variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.182175	7	0.026025	2.544343575	0.120535079	3.78704354
Columns	1.5876	1	1.5876	155.2122905	4.94E−06	5.591447851
Error	0.0716	7	0.010228571			
Total	1.841375	15				

Measure items and ANOVA for employers' feedbacks on WLA implementation.

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Q1 Sufficient time	2	7.48	3.74	0.0512
Q2 Sufficient tasks	2	7.65	3.825	0.00845
Q3 Understand employer's requirements	2	7.31	3.655	0.08405
Q4 Identify for improvement	2	7.38	3.69	0.0162

(*continued*)

(*continued*)

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Q5 Sufficient support	2	7.44	3.72	0.1352
Q6 employer's feedback was helpful	2	7.98	3.99	0.245
Q7 Overall	2	7.56	3.78	0.0578
Employers (2020)	7	27.7	3.957142857	0.03262381
Employers (2021)	7	25.1	3.585714286	0.011395238

Source of variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.149071429	6	0.024845238	1.295790389	0.38054224	4.283865714
Columns	0.482857143	1	0.482857143	25.18316155	0.002408158	5.987377607
Error	0.115042857	6	0.01917381			
Total	0.746971429	13				

Measure items and ANOVA for employers' feedbacks on WLA web-based assessment system.

SUMMARY	*Count*	*Sum*	*Average*	*Variance*
Q1 User-friendly Interface	2	8.18	4.09	0
Q2 Clear Interface	2	8.15	4.075	0.00845
Q3 The system functions smoothly	2	8.09	4.045	0.00245
Q4 Convenient to use	2	8.07	4.035	0.06845
Q5 Facilitate assessment submissions	2	8.19	4.095	0.00405
Q6 Keep good record	2	8.18	4.09	0.0242
Q7 Provided adequate training materials and guidance	2	8.32	4.16	0.0722
Q8 Overall	2	8.21	4.105	0.00125
Employers (2020)	8	32.04	4.005	0.005828571
Employers (2021)	8	33.35	4.16875	0.007669643

Source of variation	*SS*	*Df*	*MS*	*F*	*P-value*	*F crit*
Rows	0.02069375	7	0.00295625	0.280426865	0.942352555	3.78704354
Columns	0.10725625	1	0.10725625	10.17421868	0.015282917	5.591447851
Error	0.07379375	7	0.010541964			
Total	0.20174375	15				

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Enhancing Teacher Resilience for Coping with Uncertainty and Riding the Waves of Change: Voices of EFL Teacher Educators in Vietnam

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Abstract. Understanding teacher resilience as a multi-faceted and dynamic construct enables the empowerment of teachers' commitment and effectiveness in pre-service and in- service teacher training programs. Recent studies focus on the resilience of early career teachers; some models of beginning teacher resilience have been proposed by English-native teacher educators; there has been scarce international research that addresses the complexity of teacher resilience; no studies have been found in Vietnam that investigated ways of enhancing English language teacher educators' resilience. To provide rich descriptions of teachers' experiences within the teaching context, narratives and semi-structured face-to- face interviews were conducted among 20 teacher educators from English teacher education and training universities in Vietnam. The data analysis identified personal and contextual challenges and resources in building, nurturing and developing resilience. A three-stage model was proposed to foster teacher resilience, which is expected to benefit teacher preparation programs and teacher recruitment, and teacher support networks.

Keywords: Teacher resilience · English language teacher education · Vietnam · Changes

1 Introduction

Teaching is considered a challenging profession since teachers often encounter challenges in their everyday lives and work (Beltman et al. 2011; Harmsen et al. 2018). Language teaching, especially English foreign language teaching (EFL), is considered stressful and tense, full of adversities and traumatic experiences (Zhang 2021). Besides the current national and international crisis related to teacher recruitment and retention (Ainsworth and Oldfield 2019; Beltman et al. 2011), the past three years have witnessed new challenges of teaching and learning derived from the COVID-19 pandemic. During the pandemic, many difficulties seemed to appear all at once (Rabaglietti et al.

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2021). Teachers' professional and personal lives have been significantly affected (Zadok-Gurman et al. 2021). Teachers' work-life balance is one notable concern as long working hours are linked to a high level of workload stress (Jerrim and Sims 2021). This issue has been further exacerbated since the pandemic started when teachers have been facing challenges with distance and online learning (Rabaglietti et al. 2021). Teaching in this new global context consumes a lot of emotional energy and results in more trauma and stress (Day and Hong 2016). As a result of being exposed to many challenges, teachers' commitment, mental and emotional wellbeing, and persistence have been affected. Many teachers were struggling with increasing pressure to perform their teaching tasks and ensure quality in education during the COVID-19 pandemic. Their old and new challenges have been compounded in times of change. Some have left their teaching profession feeling anxious, insecure, and stressed, while others choose to stay and seem happy in their assigned roles.

Online teaching gained its dominance during the pandemic. This major environmental disturbance is treated as a part of educational evolution history (Bento et al. 2021). The shift from traditional ways of delivering face-to-face lessons into the online mode has challenged many teacher educators in adapting and adjusting to the "new normal". There was an urgent need for universities to respond to the needs of individuals by providing e-learning strategies in a variety of settings. Teachers were required to change and evolve; however, many teachers were not digitally well- equipped to prepare for new teaching experiences. Teacher educators are responsible for preparing students to "seek and create support for themselves in the early years of teaching" (Hoy and Spero 2005, p. 353). Raising standards and high educational quality should involve cultivating the emotional well-being of teachers instead of merely focusing on pedagogical innovations. Building teacher resilience, which is often missed in many countries and Vietnam's education reforms, is critical as teacher exhaustion and burnout are closely linked to students' academic achievement (Madigan and Kim 2021). Therefore, it is essential for teacher educators to enhance their resilience to sustain their long-term commitment to their profession.

As the issue of promoting teacher resilience in times of change is an under-researched area (Gu and Day 2007), this current study aims to address this gap in the literature by exploring the nature of teacher resilience. Rather than merely identifying challenges experienced by teachers during the pandemic, and the factors influencing teacher educators' resilience, this study places emphasis on the process of how teachers coped with adversity or, in other words, how the interaction/interplay between individual and contextual factors impacts on resilience. An understanding of strategies and resources used by teacher educators in response to the challenges paved the way for developing a model for promoting resilience in teacher educators.

Teacher resilience is a fruitful area of research and particularly significant at this time given the shift of the educational landscape into digital environments, and our study expects to provide a timely and unique contribution to this newly emerging field. We embarked on a study of EFL teacher trainers' experiences to better understand the dynamic and complex interplay among combinations of factors that promoted or hindered resilience. Our work offers resilience strategies to empower teachers to overcome challenges and obstacles. This study hopes to establish the links between researchers,

pre-service teacher programs, staff recruitment, and in-service professional development programs.

2 Literature

2.1 Conceptualizing Resilience and Teacher Resilience

Resilience is considered a means to help a worker overcome the pressures and adversities of the workplace (Price et al. 2012). During the process of facing adverse conditions, individuals actively employ strategies to overcome obstacles within their environment (Castro et al. 2009). A review of the literature indicates the diversity in conceptualizing resilience. The term resilience was originally defined as the ability of individuals to be 'bounced back' or recover from traumatic events (Gu and Day 2013). Recent research reaches a consensus that resilience is the capacity to adapt and thrive despite adverse situations. It has been widely accepted that resilience refers to a process of positive adaptation rather than solely an individual trait, an individual's internal capacity or innate attributes (Ainsworth and Oldfield 2019; Beltman 2015; Benard 2004; Castro et al. 2009; Gu 2014; Papatraianou and Le Cornu 2014; Zhang 2021). Wuest and Subramaniam (2021) posited that the "behaviours, thoughts and actions associated with resilience can be learned, developed, and strengthened" (p. 8).

Teacher resilience has been an emerging field of research that has been investigated from a variety of perspectives and methodologies (Beltman et al. 2011). Studies on teacher resilience adopting psychological lenses identify major psychological factors such as value, self-efficacy, beliefs and emotions (Hong 2012). Teacher resilience has been characterized by four dimensions: the professional (the practice of teaching), the emotional (emotional responses to teaching experiences), the motivational (self-efficacy, persistence, and perseverance), and the social dimension (social interactions in the work environment (Mansfield et al. 2012). Some scholars support the argument that teacher resilience is an individual capacity of a teacher to be able to make use of both individual and contextual resources to cope with adversity (Beltman 2015). Teacher resilience has been conceived as "the capacity to manage the unavoidable uncertainties inherent in the realities of teaching" (Gu and Day 2013, p. 39), or "a capacity, a process and also as an outcome" (Mansfield et al. 2016, p. 80).

Despite a diversity of definitions, teacher resilience empowers teachers to overcome challenges of the pandemic to make the adaptation. Teacher resilience can be nurtured, sustained or eroded over time in the face of different circumstances in their work and life, and teachers in the middle and later years of their careers may experience the erosion of their resilience (Gu and Day 2013). There is a close link between teacher resilience and teachers' satisfaction, commitment, efficacy, engagement, motivation, wellbeing and sense of identity. Resilience influences teachers' identity (Price et al. 2012), effectiveness (Gu 2014), job satisfaction, wellbeing and commitment (Hong 2012; Mansfield et al. 2016), and creativity (Parsi 2019). Other studies highlighted the importance of resilience for teachers in such a way that it contributes to their enhanced level of wellbeing (Chen and Le 2021). Teacher resilience enables teachers to persist in handling challenges that can arise in the future. Understanding this multi-faceted and dynamic construct

enables the empowerment of teachers' commitment and effectiveness in pre-service and in-service teacher training programs.

2.2 Understanding Teacher Adaptation

Resilience has been assessed according to how an individual adapts successfully to the new environment despite adverse circumstances (Ainsworth and Oldfield 2019; Zhang 2021). Successful adaptation has been demonstrated through some indicators such as high levels of wellbeing, job satisfaction, and low levels of burnout (Mansfield et al. 2016; Ainsworth and Oldfield 2019). Bronfenbrenner's (1979) bio-ecological systems theory was used to provide an understanding of the adaptation process.

Originally, Bronfenbrenner's theory highlighted the impact of complex and reciprocal layers of relationships within an individual's environment on his/her development (1976). He posited that an individual's immediate surroundings such as family and school are at the core of the microsystem while a larger social system forming the exosystem and the broader cultural and national context shapes the macrosystem. The chronosystem refers to the significant external or internal changes happening to an individual. All the support from these systems (family, school, social values and policies) enable personal development to be further nurtured and flourished.

Bronfenbrenner indicates the necessity of considering not only the influence of/on the individual's immediate setting but also the interdependent interaction of systems in which people participate (1976). For a teacher, the reciprocal relationship can occur in the microsystem at the level of family, institution, faculty, colleagues, etc., the mesosystem where lies the interactive structures of the research community, the exosystem constituting policies and practices regarding their profession, and the macrosystem which consists of ethical, cultural, and national values or norms, as well as global influences. Bronfenbrenner's (1979) bio-ecological systems theory is employed as a framework that can assist exploration of how teachers adapted by navigating through levels of systems. Bronfenbrenner's theory has been adopted as a theoretical lens to open up the field of research into the psychological, socio-cultural aspects of teacher resilience. The theory was devoted to casting light on how participants navigate their adaptation. It will be applied to this study's analysis of how individual differences and contextual factors are embedded in the process of coping with challenges. Positive or successful adaptation must necessarily involve at least one or many aspects such as emotional, pedagogical, cultural, and psychological adaptation. Understanding factors contributing to teachers' successful adaptation is necessary for improving the experience of educators.

2.3 Factors Affecting Teacher's Resilience

Recently, there has been a surge of research on teachers' resilience which identifies and examines individual and contextual factors that contributes to the high level of resilience (e.g. Ainsworth and Oldfield 2019; Mansfield et al., Mansfield et al., 2016; Zhang 2021). Research documents individual-level factors such as emotional intelligence, self-care, self-esteem (Ainsworth and Oldfield 2019) self-efficacy (Beltman et al. 2011), motivation (Gu and Day 2007), and other attributes. Contextual-level factors are support

from management and colleagues, workload, and school culture (Ainsworth and Oldfield 2019). There is also abundant evidence that caring and trusting relationships in the workplace contribute to teachers' enhanced resilience (Goodwin 2005; Gu 2014; Luthar and Brown 2007). Teachers' positive emotions, supportive relationships, and a calm working environment help change stress to resilience (Rizqi 2017). For an early-career teacher, relationships with students, teaching colleagues, leaders, peers, family and friends, other professional staff, parents of students, and themselves contribute to their enhanced resilience (Le Cornu 2013). Contextual and individual factors are equally important (Ainsworth and Oldfield 2019) in enabling teachers to thrive within the profession. These are protective factors for teacher resilience. They are resources of assistance for teachers to manage challenges and retain teachers' commitment (Mansfield 2016).

A growing body of research has also investigated a plethora of factors inhibiting teachers' capacity to cope with adversity. For instance, challenges from teachers' professional life such as heavy workload, classroom management, lack of support, lack of resources as risk factors threaten the development of resilience (Mansfield et al. 2012). Contextual challenges come from the pre-service program, the family, the school, and the professional work context (Beltman et al. 2011). Ineffective class management, unsupportive leadership, dearth of resources, and weak rapport are popular risk factors.

Both personal and contextual factors can act as challenges or resources for teacher resilience. Protective factors need to be enhanced while the risk factors should be reduced. The literature points out that teachers face considerable adverse pressures and unavoidable uncertainties inherent in the realities of teaching, especially the teaching practices during the COVID-19 pandemic. However, less attention has been paid to understanding both aspects of resilience, namely strength and vulnerability (Hong 2012). A complete understanding should involve an understanding of both individual and contextual challenges for teachers. As teacher resilience is a multi-faceted and dynamic notion, the need to investigate resilience in multiple contexts is urgent. A review of the literature indicates the dominance of teacher resilience studies conducted in Western countries, particularly English-speaking countries, so an Asian perspective, particularly voices from Vietnamese teachers' in this study, could offer further insights into the nature of teacher resilience.

Although teacher resilience has recently attracted scholarly attention, to date, existing literature around teacher resilience mostly relies on surveys for exploring perceptions of resilience. Much research on teacher resilience tends to focus on risk factors affecting teacher retention or highlights the role of protective factors. There is a lack of a body of in-depth studies addressing the complex nature of resilience or the multiple factors embedded in the individual, relational and institutional conditions. There is also a dearth of research focusing on understanding the strategies or resources that were adopted by teachers when facing challenging circumstances. It is equally important to understand what motivates teachers to retain their resilience in their profession as well as the process of how teachers overcome adversity because teacher resilience manifests differently among individuals and depends on different challenges and adverse situations.

Researchers have attempted to understand what and how beginning teachers employ resilience strategies to handle adverse circumstances (e.g. Castro et al. 2009). Research also documents some strategies for strengthening resilience. Problem- solving, goal

setting, maintaining work-life balance enable teachers' resilience (Mansfield et al. 2016). Some effective interventions to improve teacher resilience and well-being during the COVID-19 pandemic include inquiry-based stress reduction (IBSR) (Zadok-Gurman et al. 2021) and mindfulness-based stress reduction (MBSR) (Matiz et al. 2020). Other strategies that help strengthen teacher resilience include prioritizing self-care, cultivating a growth mindset and practicing self-compassion, nurturing connections, and adopting a cognitive strategy (Wuest and Subramaniam 2021). While available literature is in favor of exploring early career experiences. There is a scarcity of research systematically examining teachers' experiences at other career stages, that is, mid and late careers.

Recent studies focus on primary and secondary teachers (e.g. Jerrim and Sims 2021; Gu 2014; Ainsworth and Oldfield 2019; Gu and Day 2007; Gu and Day 2013; Hong 2012; Mansfield 2016). Limited studies have investigated teacher resilience among higher education institutions (Appolloni et al. 2021; Bento et al. 2021; Castro et al. 2009). Also, these studies treat participants from various countries as a homogeneous group and none applies exclusively in light of those from Vietnam, who possess distinctive characteristics than other teachers from English-speaking countries. There are also attempts in developing frameworks for building resilience; however, they are restricted to the theoretical approaches, identifying overarching themes. Moreover, these frameworks or models are English speaking context-based, which cannot be imported into the Vietnamese context. An evidence-based model should be developed for Vietnam teacher education programs.

3 Methodology

Bearing in mind that the qualitative approach is suitable for studies emphasising process and complexity and seeking to explore how people make sense of their experiences and behaviours (Denzin and Lincoln 2011), the qualitative approach was employed by this study.

3.1 Selection of Participants

Compared to the sampling principles in the quantitative approach, sampling in the qualitative inquiry is more strategic and purposeful (Mu 2016), depending on the richness and relevance of the information. Rather than the question of how many participants are sufficient, it is the question of how the entire content domain of the activity is captured and described (Butterfield et al. 2005). In this study, a total of 20 university educators from 5 universities in the North, Central and South of Vietnam participated in our study. As "rigorously collected qualitative data from small samples can substantially represent the full dimensionality of people's experiences" (Young and Casey 2019, p.12), sample sizes in this qualitative study are guided by data adequacy rather than numerical expectations. 35 participants approved to take part in the research but due to the COVID-19-related unexpected situations of many participants, finally 20 participants' responses were recorded. Participants included five teacher educators from disadvantaged mountainous areas, 15 from urban regions. The majority of teacher trainers came from the North of Vietnam (n = 15, 75%), the rest from the Central (n = 2, 10%) and the South of Vietnam (n = 3, 15%). They are categorised into three groups: early career teacher

educators (0–5 years), middle career educators (6–15) and late-career educators (15+). Although this research sought to balance female and male interviewees, more female participants were interviewed. The dominance of female teacher trainers is a typical situation among teacher education institutions. The demographic characteristics of the participants are illustrated in the following Table 1:

Table 1. Demographic characteristics of participants

Demographic	Category	N (%)
Gender	Male	5 (25%)
	Female	15 (75%)
Age	22–29	1 (5%)
	30–39	10 (50%)
	40+	9 (45%)
Qualification	Master in TESOL	16 (80%)
	PhD in Education	4 (20%)
Location of institution	Urban	15 (75%)
	Mountainous	5 (25%)
Career stage	Early career (0–5 years)	11 (55%)
	Mid-career (6–15 years)	3 (15%)
	Late-career (15+ years)	4 (20%)

It has been argued that participants tend to provide more forthcoming, personal, and honest responses to the person they know and trust (Hammersley and Atkinson 1983), the researchers sourced participants from their networks such as friends, colleagues, and alumni groups. These personal relationships enabled the authors to obtain more useful data and allow the participants to feel secure when having their experiences audio-taped. Before the data collection was carried out, the participants were informed of the study and the procedures related to data collection, confidentiality, and storage. They were also aware of their right to withdraw at any time.

3.2 Data Collection and Analysis

To explore in-depth teacher educators' experiences, this study relies on participants' self-reports and semi-structured interviews.

As resilience is reflected differently among teacher educators, a qualitative approach was employed to provide an insight into teachers' adaptation through teacher educators' accounts of experiences related to teaching during the pandemic. The complex nature of resilience and adaptive processes permeated our choice of qualitative research method. The semi-structured interviews, composed of seven questions, were adopted for identifying a list of individual/contextual factors that affect teacher resilience. The interviewees

Table 2. Profiles of 20 participants

Ppt	Name	Age	Gender	Location of institution	Qualification	Yrs. of exp
1	Lan	34	Female	Urban	PhD in Ed	12
2	Ha	35	Female	Urban	MA in TESOL	13
3	Hung	42	Male	Urban	PhD in Edu	4
4	Linh	44	Female	Mountainous	PhD in Edu	22
5	Trang	45	Female	Mountainous	MA in TESOL	9
6	Binh	43	Male	Urban	PhD in Edu	13
7	My	35	Female	Urban	MA in TESOL	13
8	Hoa	38	Female	Urban	MA in TESOL	13
9	Thu	44	Female	Mountainous	MA in TESOL	21
10	Nga	34	Female	Urban	MA in TESOL	12
11	An	32	Female	Urban	MA in TESOL	9
12	Chi	35	Female	Urban	MA in TESOL	13
13	Tung	31	Male	Mountainous	MA in TESOL	9
14	Nhung	40	Female	Urban	MA in TESOL	17
15	Giang	42	Female	Mountainous	MA in TESOL	19
16	Hanh	37	Female	Urban	MA in TESOL	12
17	Kim	29	Female	Urban	MA in TESOL	7
18	Mai	40	Female	Urban	MA in TESOL	15
19	Trung	45	Male	Urban	MA in TESOL	22
20	Nam	38	Male	Urban	MA in TESOL	13

were asked to describe the challenges they had experienced and resources that helped them remain in the profession. The semi- structured interviews provided more space for respondents to narrate their experiences while enabling the researchers to exercise less control of the interview data. Such an interview protocol offered the most effective way for us to probe deeply into the interviewee's stories.

The interview questions were centred on finding how teacher educators' resilience was manifested to help them cope with teaching obstacles (for those who strived to thrive during the pandemic) and identifying constraints factors (for participants having negative experiences). After demographic information such as gender, the number of years in the profession was obtained, sample interview questions cover the following topic: teachers' experience at different stages (early- career stage, during the pandemic), strategies for coping with adverse circumstances, resources that teachers rely on to overcome challenges, factors that hinder positive adaptation. Some possible prompt questions were noted down in case the interviewee provided short or poor-in-content

responses. Each interview lasted roughly between 45 min and 60 min. One-to-one in-depth, semi-structured interviews were conducted face-to-face or via phone at the participants' convenience. Not all the participants felt comfortable using English to speak or write about their experiences. In that case, interview responses were translated from Vietnamese into English. The audiotaped and written responses were then transcribed and coded with NVivo. The coding of data was conducted independently. A follow-up interview was used as a cross-checking technique for seeking the mutual agreement of themes/categories from each participant. This technique helps increase the credibility of qualitative research. The interviews and follow-up interviews were collected and interpreted by each researcher before being sent to other researchers for their interpretation. Data analysis relies on inductive analysis and the constant comparison method (Hong 2012). Specifically, the transcript of each interview was thoroughly read for the identification of broad and narrow categories. The emerged themes were cross- checked and clustered, followed by an examination of patterns across all participants. The predetermined codes and themes were constantly compared to identify the commonalities and variations between two sets of data (pre-determined and preliminary emerged themes and categories). Each researcher is involved in the reporting stage of primary findings. As multiple researchers, we compared findings and reached a consensus about the primary findings to enhance reliability. For anonymity, all personal names of people, institutions, or places were not published, and the names of interviewees were replaced with pseudonyms *(as seen in Table 2)*.

3.3 Our Positioning in the Research Process

Our collection, analysis, and interpretation of data were influenced by our collegial relationships. Besides the benefits, we faced some difficulties as researchers and friends. Some participants gave one of the researchers a lot of 'positive answers,' describing the bright side of the adaptation. However, in follow-up interviews via phone, these respondents revealed that they were not willing to adapt. They had no choice but to be perseverant because they had to commit to the job. This also impacted the ways we interpreted as researchers because the information we obtained from the self-reports could not be exact representations of the participants' real experiences. In that case, we had to amend the previously collected data and rely on the amended data for analysis.

4 Findings and Discussions

4.1 Challenges from Teaching Online as Risk Factors to Positive Adaptation

During the pandemic, EFL teacher educators had to cope with diverse challenges. These internal and external forces are categorised into three main domains: socio- cultural, pedagogical, and psychological aspects.

4.1.1 Challenges of Managing Dual Roles: Parenting and Teaching

Teacher educators reported a struggle to be both good parents and effective teachers in their effort to adapt to new teaching modes during the pandemic, especially when

they had to take care of family members who contracted the Coronavirus or were close contacts. They perceived family duties as barriers to their adaptation to online teaching. There were some complaints about the difficulty of balancing teaching and parenting duties among female participants:

> *Sometimes, I feel exhausted. I have to take care of three small and naughty kids, feed them, deal with their constant fights and at the same time, I have to prepare hundreds of things for my lessons, consult my students and instruct them with technology. (Lan).*
>
> *The only challenge I have to face is my noisy kids. I have two daughters who are in grades 4 and 2. Every day, while I am teaching, they keep asking me for help, like "Mommy, I can't open this link!", "Mommy, the Google meet disappears!" and even "Mommy, I need you, I am having a quick test!", etc. Not to mention, I also have a hyperactive baby boy who constantly knocks on the door, and he keeps calling me out loud every second he goes to the toilet. (Mai).*

The traditional duties of Vietnamese women were tied to housework, and this cultural aspect persists in modern Vietnam. The socio-cultural expectations on women to perform well both at work and at home seem to create pressure on female lecturers, which makes them juggle their family life. These findings are consistent with Phan's (2015) study, and Do's (2020) which revealed that parenting roles seemed to inhibit female lecturers from effective teaching.

4.1.2 Pedagogical Concerns

The lack of teaching resources has been identified. The following educator reported inadequate support from her university such as technological facilities or technical assistance:

> *I guess the university has put the burden on teachers' shoulders. I have to purchase the licensed version of Zoom, which takes up a considerable amount of money. I have already asked for assistance from the university to buy Zoom, but you know the answer. I feel a bit disappointed by the ignorance of the university, but you know, it is not like I can post my annoyance on an anonymous confession page or something. (Lan).*

The pandemic has caused pedagogical impacts on teacher trainers, who have been familiar with face-to-face delivery mode. The participants lamented that they were not well prepared for the new way of teaching in digital environments. Lecturers have been struggling with how to best adapt their teaching methods to meet the teaching needs of online teaching. The following educators described their situations:

> *Sometimes, I felt a bit disappointed in the reality that I had to sit in front of the laptop screen for ages, and I yearned for face-to-face communication. (Kim).*
>
> *The pandemic has made a swift change in my teaching habits. (Tung).*
>
> *I miss my face-to-face lessons where I can check my students' learning progress or call them randomly. Right now, my students have tons of reasons to say no, as*

my electricity has just gone out, there is something wrong with my microphone, or my internet connection is not working, etc. I am so sick of it, but I can hardly do anything. (Ha).

Some participants considered their lack or low technological competence the most challenging issue.

I was a little overwhelmed with the teaching loads and other schedules and tasks required by our university, such as attending ICT-related training workshops (Tung).

While the majority of participants appraised the benefits of online teaching, some educators found it hard to adapt to the new teaching model. Monitoring students' learning progress and attendance challenged Binh's adaptation. Lecturers in the mountainous areas reported their concerns about their students' access to educational technologies and internet connection. For example, the following compounded problems are attributed to Ha's resistance and hesitancy in shifting to synchronous teaching:

Although I discussed zoom etiquette to establish a code of conduct: acceptable behaviours, expectations, ways of working, and especially participation and interaction during the delivery, many problems occurred. Many times during the discussion, all students kept silent with their cameras off. They had several reasons for not being involved in the activities, such as unstable internet access, something wrong with their speakers or cameras etc. (Ha).

Some of them complained about the limitations of online teaching, which deprived them of interaction with students. For instance, Thu provided her explanations as follows:

I experienced a lack of interaction amongst us, especially for the courses with over 20 students. It was too difficult to manage and know if they were with me or doing other kinds of stuff during the lesson delivery. I felt it was a bit hard to create an inclusive and caring atmosphere in my virtual class despite being aware of its value to students' wellbeing and academic achievement. (Thu).

Technical issues occurring during the online teaching, lack of students' motivation, and inadequate teaching environment also challenged teacher educators.

However, there were many times the student did not pop up until checking attendance. Sometimes, technical problems occurred; for example, all the answers were shown before the question. I did not have my own space for teaching, so I had to use my family's common room. It was noisy, and that affected both my family members and the students. (Giang).

4.1.3 Psychological Aspects

Many lecturers experienced distress due to the lack of access to online teaching devices and tools. These educators felt burnout because they had to adapt to the rapid shifting in their teaching while having to cope with their challenges such as isolation, stress, and their physical/mental health.

I had to learn new technologies while coping with full-time work from home. I felt isolated emotionally and distressed during the quarantine and social distancing periods. (Chi).

The lack of interaction with students during online teaching has a psychological impact on lecturers:

I felt very bored because the relationship between lecturers and students was distant, not as warm and caring as when we do face-to-face lessons. (Hung).

It was remarkable that Hung, an educator in an urban university, exhibited constant worries and doubts about his technological competence by repeating many times in the interview that he was 'not competent', 'low proficient', 'lack of technological competence.' It seems that Hung had a lower sense of teacher self-efficacy than did his colleagues in mountainous institutions.

Others faced the difficulty of shifting to a new teaching mode due to their unwillingness to change:

It is exciting to know more but to be honest, I am not that willing to learn. I sometimes felt overwhelmed. Talking about painful experiences, I would say dealing with computers was such a nightmare. My laptop was quite old, so it took a decade to process, not to mention, to open zoom and several links at the same time. Very often, I logged on and off the Zoom meeting due to the internet connection. Things like that got on my nerves. I really hate teaching online. (Ha).

Many female participants experienced anxiety, the stress in an unsupportive teaching environment. They confessed that they suffered from perfection. The desire to become a successful teacher educator and a fulfilled mother/wife results in their excessive energy and causes distress.

The most striking finding of our study is that more challenges come from the context than personal circumstances. This finding is consistent with the finding of Ainsworth and Oldfield's (2019) study, which indicated the dominance of contextual level factors when predicting teachers' adaptation.

4.2 Resilience-Enhanced Resources

The shared finding of how resilience was constructed is that all the participants relied on both contextual and individual-level resources to manage their adversities.

4.2.1 Sources of External Support as Facilitators for Positive Adaptation

There are different sources of support that facilitate educators' adaptation process. All the participants (n = 20) valued the pivotal role of technology in their online teaching. For instance, for Hung, "Technology, technological tools and gadgets were essential during that time," and "Technology has made the impossible possible." An attributed her positive virtual teaching experiences to her access to licensed Zoom, stable internet connection, and useful educational software and applications.

Support from family was rated as a strong source of emotional support, and for several participants, the only source of support.

My family, and to be specific, my daughter was supportive. She was quite obedient, and she let me teach in peace every time I had online lessons. My mother helped me with the housework and cooked meals for me. (Nga).

For Lan, the financial and mental support from her husband enabled her to handle adversity.

Things were really hectic, but somehow, I still managed to survive thanks to my husband's financial and mental support. (Lan).

Hoa also appraised her husband's support as a facilitator for her thriving in her profession:

If you want to shine with teaching online, at least you should have a top- notch laptop, a strong Wi-Fi connection and a lot of money to purchase cool technological tools. Trust me! So, the only resource that supports me to teach online smoothly and successfully comes from my husband. He caters to every need of mine and helps me feel at ease to teach. (Hoa).

Previous research has highlighted the importance of family in fuelling teachers' motivation to succeed and thrive despite challenges. They are family-oriented rather than career-driven people. Some participants pursued their dream of becoming lecturers to fulfil their family's dreams. In Vietnam, the teaching profession is on the list of stable, elite, and honourable jobs which give a sense of peace of mind to those employed. The family is a source of emotional support in troubled times like the pandemic.

It is remarkable to hear voices like Hung, Lan, and Linh who are working in the same university. Hung appreciated the enormous support he had received from his institution, such as training sessions, professional development programs, mindfulness sessions, and COVID-19 grants. Among factors that foster resilience, the workplace culture and support was reported as the most significant factor. Lan acknowledged such assistance but did not rely much on this institutional support:

The university supports us a little bit by supplying a VNU email with unlimited storage of Google Drive and launching tons of workshops and seminars to guide us with online teaching. Well, not all of them are helpful. For example, there were a lot of workshops on the topic of meditation and mindfulness to mentally soothe teachers during the pandemic. I don't think I seriously need them since it is kind of phony and one-sided. (Lan).

Linh benefited more from her colleagues' support rather than from her faculty or university in terms of technical and pedagogical aspects:

My colleagues are always helpful and reliable, and some of them are really hi-tech. We have a group chat on Zalo, and we often share about things related to teaching. For example, when I have trouble with making an online quiz, I don't know how

to bold the texts for the reading exercises. I can always ask one of my colleagues - an IT expert in my group, for help. And sometimes, to make it more convenient, I can ask for her readymade online materials. (Linh).

For participants like My and Hoa, students' feedback is their source of encouragement.

Students' feedback is my source of encouragement. Whenever I host a cool activity, they would wow and drop a lot of emoticons on the chat box, and at that moment, I instantly knew they were having a good time with my lessons. (My).

Their successful teaching experiences are affected by recognition from students, and this source is important in evoking positive feelings. This study confirms the literature studies arguing that emotional attachment between teachers and students were closely connected with their job satisfaction and commitment.

The influencing level of each source varied among participants; however, a variety of work-related sources facilitated all the participants. These included support from the university and faculty, colleagues, and teacher communities. The participants attributed the enhanced resilience to the workshops, seminars, peer support, and online mentoring programs. They also valued family support and informal support networks to help them cope with adversity.

This study also confirms the previous studies by emphasising the significance of caring and harmonious relationships (Phan 2015; Tran 2006), which come from their families, friends, students, colleagues and university. Participants felt committed to the profession as they enjoyed harmonious relationships with colleagues, positive rapport with students, which, according to them, create a healthy, friendly, and supportive working environment. Their resilience rests fundamentally on caring and trusting communities. Trusting, respectful and reciprocal relationships enable the respondents to feel more empowered to develop their skills and to participate confidently in the school communities. It was claimed that these relationships exert positive pedagogical and emotional influences on teacher educators. More specifically, they "feel happier, less stressful" (Nam), "more inspired" (My), and "more motivated" (Hoa). It is therefore important to build strong and caring relationships with colleagues and students to increase teachers' wellbeing in the workplace. Supportive communities need to promote a sense of belonging, acceptance, wellbeing, foster pedagogical and professional growth.

The data of this study also showed that educators working in disadvantaged mountainous areas experienced tremendous multi-layered contextual constraints that hindered their professional development, including insufficient teaching facilities and inadequate management support. Teachers educators did not feel a sense of belonging and connection to their institutional community. Being stretched to fulfil the expectations and requirements at work with limited support, most of these EFL teacher trainers strived to survive. Consequently, emotional exhaustion, burnout and attrition are typical issues for those working in remote areas.

4.2.2 Teacher Self-efficacy

This study highlighted the essential role of teacher self-efficacy- "people's perceptions of their competencies, and these beliefs affect their choice, their effort and persistence, the resilience in overcoming obstacles" (Zeldin et al. 2008, p. 1036). Akinbobola and Adeleke (2012) elaborated on self-efficacy beliefs as follows:

> *Individuals who feel that they will be successful on a given task are more likely to be so because they adopt challenging goals, try harder to achieve them, persist despite setbacks, and develop a coping mechanism for managing their emotional states. (p. 59).*

It is also argued that those perceiving inadequate or adequate knowledge and skills experience a strengthened or diminished sense of personal teaching competence (Phan 2015). The level of adaptation depends on how open they were to innovation before the pandemic. In our study, Lan possesses a high sense of teaching self-efficacy because she believes in her capacities to successfully carry out her teaching tasks. Her high level of self-efficacy showed her exercise of control over adversity.

> *I love computers, technology and all of the cool gadgets, and it is not too hard for me to keep up with the trends (either in fashion, music or technology). I am sort of receptive and willing to change. So right after the first outbreak of Covid-19 in the spring of 2020, I spent one week searching, preparing and gathering all of the online tools I could resort to. The very next week, all of my classes went online without any support or instructions from the university. I just thought, "It's not like the Coronavirus may get out within one week or two. Go with it! (Lan).*

For Lan, resilience seems to be a capacity in herself that helped her survive and thrive. Interestingly, among participants, Thu and Mai revealed that their perception of perfection motivates them to move forward:

> *Once I open my laptop, log in to Zoom and start lessons with my students, I want to make sure that everything is perfect and ready. (Thu).*
>
> *My desire to become better and to be able to adapt to new challenges pushes me to thrive. (Mai).*

Interviewed teacher educators' self-efficacy is affected by cultural orientation. A sense of moral purposes and ethical values are critical to their resilience and commitment. Their self-beliefs were nurtured by socio-cultural values. In Vietnam, teachers are socially respected and honored, and teaching is generally regarded as a highly-respected profession. One educator explained:

> *I commit to my teaching profession because it is a stable high-status job, the work is not hard or competitive. It is also suitable for personal personality. I highly appreciate this career, and I find the whole society shares the same viewpoint. (Kim).*

It has been learnt from this study that these self-beliefs enable them to bounce back" in stressful situations and thrive during the pandemic.

4.3 Strategies for Building and Promoting Teacher Resilience

A variety of strategies were adopted by the participants. Although almost all the participants (19 out of 20) experienced ups and downs during the pandemic, they demonstrated their different levels of resilience in making the pedagogical, emotional, socio-cultural, and personal adaptation.

4.3.1 Making Pedagogical Adaptation

Nearly all the teacher educators made efforts to change their teaching methods. 13 out of 15 teacher educators working in urban universities prioritized interactive teaching for engaging and motivating their students' in-class activities. Among two remaining urban teachers, one was not willing to change while the other shifted into 'mono-talk' teaching. These findings are illustrated in the following excerpts:

I am not willing to learn and change. I only make use of several familiar tools such as Zoom, Google meets, padlet, google drive and so on. I don't want to spend more time searching for something new. I am fine with just limited resources. (Ha).

I had to shift gamified teaching into mono teaching. Most of the time, students just listened to my lectures. I found it hard to design interactive activities as face-to-face lessons. (Nam).

Those with high teacher self-efficacy expressed their pro-activeness and put more effort into adapting to the new teaching context:

During online lessons, I always encouraged my students' participation. I set the rules that during my lesson, I would call my students to answer my questions. If they did not speak up when I called, they would be marked as "negative", and that would be counted for participation. Normally participation weighed about 10–15% of the ongoing assessment. Those who were active in-class activities would be marked as "positive", and they would have a higher percentage in their final assessment. (Lan).

When I have to teach speaking, I find that if I give students group tasks, they are a bit reluctant to work in groups and in fact, they don't say a word. OK, how about working individually and recording your answers and posting on Flipgrid? (Hanh).

For educators working from rural and disadvantaged contexts, changing learning goals, seeking effective teaching techniques, and adapting teaching and learning resources were some ways they applied to their online classes. One of the lecturers explained the underlying reasons for her pedagogical change and described her strategies:

Contextualizing the learning materials to tailor specific learner groups was critical in my teaching context because of the significant diversity at my university. My

students were different in terms of linguistic and cultural backgrounds, and English was the third language for most of them. Therefore, scaffolding their English learning with authentic, meaningful materials was always considered. (Linh).

I often incorporated TV segments, videos, and websites that students could visit later to search for more information. During program delivery, based on my student's feedback, I made adjustments regarding material selection, activities, and assessment tools in response to students' specific circumstances and needs. For example, I used more videos and audio materials for classes with students from indigenous groups, namely Thai, Hmong, Kme, Khmu, whose cultures and languages were predominantly oral. (Thu).

Perceived as the most important strategy by Trang, conflict solving strategies were used in her class in response to varying expectations and learning styles. These are specified in setting rules and implementing virtual classroom management skills to avoid conflicts and misunderstandings.

I discussed zoom etiquette with my students, such as using real names, being punctual, using the chat function to ask questions, turning on cameras, muting when not speaking, dressing as they would in class, showing respect and avoiding distractions or multi-tasking, and participating in activities etc. (Trang).

It was agreed among these teachers that being patient and flexible to adapt pedagogy to meet students' diverse needs was key to solving problems that might occur during program delivery. According to Tung, an educator from a university in the North, Kinh students who are more concerned about personal achievement and external judgment prefer to work individually, while students from Laos and Hmong students like the group focus. The difference is rooted in their cultural lifestyles.

4.3.2 Adopting Positive Psychological Strategies

In this study, positive thinking is perceived as a contributing factor to successful adaptation and teachers' capacity to overcome difficulties and thrive. For Hung, adopting a positive mindset helps him adapt successfully:

I don't know for sure, but I think we should be prepared. And the most important thing is that we don't know what the future holds, so just embrace it. (Hung).

For some participants, positive thinking, continuous self-reflection, and preparedness are the most important emotional boosters.

My motto is "The only way out is up". I would never stop myself with a fear that I can't do it or it is out of my league. Whenever I encounter a situation of hardship, I stop for a second to figure out what kinds of things I can do, think of options and go! If things haven't gone well, it means that I am not trying hard enough or the path I have chosen is wrong. Hence, I think the primary strategy I apply in every adverse situation is trying and trying many times. (Chi).

Instead of thinking negatively and getting depressed by changes, I have learnt to make plans for my teaching. I mean, a detailed, feasible and flexible plan since who knows, it might change within seconds. (Kim).

I pay full attention to preparing my lesson. I encourage students to study, always smile, and give them positive advice. (Nhung).

Self-caring was claimed as one significant strategy popularly adopted by EFL female teacher educators during the difficult time coping with COVID-19. Being more family-oriented and self-oriented enhanced their resilience.

When I had COVID, I put all the deadlines and workload aside. I looked after myself and my children. I paid more attention to my physical body and mental wellbeing. Most of the time, I learnt how to breathe well, eat well, sleep well and be happy to be healthy again. (An).

I think about myself first. Teaching happily will make me happy. I try my best to avoid negative thinking in work and life. (Chi).

Managing emotions was used by Mai when dealing with challenges:

When I asked students to raise their voices but they just ignored me, I really wanted to yell at them and ask them to get out of my class. But I had to control my anger. Instead of asking them to turn on their microphone, how about showing emoticons and noting thoughts on the chat box? (Mai).

4.4 Teacher Resilience and Transformation as Outcomes of the Adaptation Process

Despite ups and downs with their teaching during the pandemic, all participants experience a transformation or, in other words, adaptation. Positive pedagogical impacts were documented:

I become more digital literate. (Trang).

The best merit is I now can get a bunch of useful gadgets to make use of in online classrooms. (Ha).

The participants also experienced changes such as improved confidence, open- mindedness, and promoted interactional skills. Hanh also reported her powerful emotional and cognitive transformation:

Health is the most important thing in life. I was so worried about my health and my family. I even thought, what would happen if I died of COVID? I was not serious about work-related pressure or deadlines. I have become more optimistic and resilient. (Hanh).

Nam's perceptions changed after the pandemic:

When the pandemic started, I thought that online teaching was ineffective, and I could not do my job well. However, after a while, I noticed that if teachers could control students' learning resources and interactions, online teaching could still work in many contexts. (Nam).

For Linh, resilience was promoted when she learnt to adapt during the pandemic "*I have been thriving to cope with uncertainty."*

These findings support the argument that adaptation is an active personal development rife with positive experiences (Gu et al. 2010). Our study reveals that teacher resilience is "a capacity, a process and also as an outcome" (Mansfield et al. 2016, p. 80). Some participants used resilience as a capacity to make successful adaptation while some achieved enhanced resilience as an outcome of their adaptation process. In other words, resilience enabled teacher educators to thrive, and it is also understood as the ability to thrive despite adversity.

4.4.1 Implications: A Model of EFL Teacher Educators' Resilience

Some significant insights have been gleaned from our study concerning EFL teacher resilience. Successful adaptation requires both individual and contextual level factors. Bronfenbrenner's (1979) theory has been adopted as a theoretical lens to shed light on the interplay of these factors. Focusing on developing a teacher's capacity without acknowledging the importance of contextual resources is not sufficient for developing teacher resilience. Teachers need to receive support to help them thrive in their teaching profession. Collaborative institutional culture – "the values, beliefs, norms, assumptions, behaviours, and relationships that characterize the daily rituals of school life (Johnson et al. 2014, p. 539) – plays an important role in promoting teacher resilience. Different sources of support should be harnessed to create happy teacher educators who thrive as resilient professionals.

Relationships play a pivotal role in teacher resilience (e.g. Le Cornu 2013; Day and Gu 2010). Positive and loving personal relationships can function as protective factors in promoting resilience. Maintaining good relationships with colleagues will also influence the teaching journey. As "…resonant relationships are like emotional vitamins, sustaining us through tough times and nourishing us daily" (Goleman 2007, p. 4), it is important to embrace social connections and caring, meaningful relationships.

Teachers benefit from supportive university leadership and colleagues, but supportive communities of teacher educators do not happen by chance. Strategies that can nurture collaboration among teacher educators should be developed. Peer-support groups should be fostered where novice teachers can be assisted by experienced teachers in terms of advice, guidance, and support. Academic institutions need to encourage the development of a family-friendly culture to support parents.

Female teacher educators can experience both internal and external sources of tension and distress, ranging from juggling competing roles as teachers and mothers. Female teacher educators need to be supported both academically and psychologically. They experienced a fluctuation in their flow of emotions during the pandemic. They emphasize the importance of emotional support, which gives them reassurance and a feeling of being cared for. It seems that emotional resilience - the ability to "find benefits within adversity"

can be achieved in many ways, such as humor or laughter, expressing appreciation, love, and gratitude, and effective problem solving (Fredrickson 2003, p. 335) – is associated with teacher resilience. Teachers can seek personal capacity or support from outside sources to promote their emotional resilience.

Our study also indicates the importance of emotional management in a range of diverse and challenging circumstances. It is therefore essential for emotional management skills to be included in the model. Cultivating a growth mindset or adopting a cognitive strategy can assist those seeking an escape from distress and fear. Available mindset techniques play a part. For example, meditation exercises can quieten teachers' minds and alleviate stress and anxiety that may arise during the process of shifting from traditional classrooms to virtual ones. One of the psychological support tools is 'tapping.' This ancient but proven mind-body healing technique enables teachers to release stress, the feeling of being overwhelmed, and other low vibration/negative emotions. Also, focusing on self-care and self- understanding should be fostered among teachers because they empower teachers to overcome emotional challenges in life and to make use of these challenges as opportunities to leap forward in their lives. Self-understanding can be compared with the 'inner knowing', the hidden power of each teacher.

Bearing in mind that resilience can be learnt and fostered, we have developed a context-based model for building and promoting EFL teacher educators' resilience. Our model, which is illustrated in Fig. 1, helps address the complex nature of resilience as an individual capacity, an outcome of an adaptation process, and also a process of personal growth. This model serves as a guide for stakeholders and curriculum designers to plan and implement language teacher training programs. It consists of three stages as follows:

The first stage is *Name (Know-It)*. This stage focuses on the question of *what* and *why*. Identifying and understanding what factors and why such factors foster and hinder the development of resilience is critical, paving the way for making any change to address it. From the bioecological perspective, the environment where teacher educators are living and working can foster or impede resilience. Teacher educators are impacted by the interplay between contextual challenges/resources and personal challenges/resources under different systems. Teacher educators sit in the center of the system capacities, skills, self-belief, resilience, and self-efficacy. These factors can be sources of challenges or resources depending on whether they facilitate or hinder the adaptation to a new/adverse environment. Contextual-level factors include facilitators or hindrances from the global context, the national, social-cultural context with policies and culture, local communities, institutions, colleagues, family and friends. These have impacts on teachers' adaptation in different levels: socio-cultural, pedagogical, and psychological. Understanding which resources teacher educators often rely on helps us adopt effective strategies or skills in the next stage.

The second stage is *Tame/Change (Do-It)*. In this stage, all the factors are addressed. The emotional issues involve emotional management strategies, and pedagogical concerns are handled by changing the pedagogy. Embracing connections and relationships, especially caring and meaningful relationships is employed in response to the situations where they play a role as an emotional booster. Emotions are tamed, and actions are adjusted or changed. This evidence-based model indicates some strategies used by the participants such as pedagogical adaptation, growth mindset cultivation, self-care and

self-understanding, emotional management, relationship development, support-seeking strategies. They proved to be useful and effective for EFL teacher trainers.

The third stage is called *Gain (Get-It).* Resilience is the utmost outcome of teachers' adaptation in the face of adversity. Although the transformative development trajectory to resilience is fluctuating, with ups and downs, transformation and a high level of resilience will be achieved or gained. This three- stage model is beneficial in that it provides deep insights into the complex nature of resilience and ways for enhancing the resources and alleviating negative impacts on this development. Teacher education training programs can develop modules or toolkits based on this model.

5 Conclusion

This empirical work has shed light on denoting the multi-faceted nature of teacher resilience. Our study can be considered a pioneering study in Vietnam in exploring EFL teacher educators' resilience during the pandemic. The analysis of the qualitative interviews illustrates the emergence of new pedagogies and awareness among EFL teacher educators. An important finding is that both personal and contextual supports play significant roles in building, nurturing and developing resilience. The identification of resources fostering resilience paves the way for initiating help and support.

This study can benefit various contexts of teacher training by providing strategies for teachers to use in diverse working contexts such as Vietnam's urban, regional and remote institutions. Considering EFL teacher educators, this study is beneficial in that it improves their awareness of challenges and the role of resilience in their teaching. The model could be used as a reference framework for preparing teacher preparation programs and teacher recruitment, and teacher support networks. Leveraging on empowered individuals and relying on available resources within the teacher communities help foster teacher resilience.

Teacher resilience should be considered a pivotal component of teacher training programs because it can empower them to manage the uncertainties in the future, to weather the unpredictable storm that can happen to their work and life. Understanding what influences teachers' resilience over the course of a career helps identify sustainable factors that contribute to the capacity to manage adverse situations and enables teachers to flourish in adverse incidents such as the COVID-19 pandemic. The utmost outcome of any teacher training program is highly qualified teachers who are satisfied with the profession and retain their commitment, motivation, and enthusiasm over years (Mansfield et al. 2016); therefore, teacher resilience should be treated as one of the most important research issues, regardless of career stages. More extensive examinations should address the complex contextual challenges of teachers. More investigations should address how resilience can be cultivated and promoted, and what resources teachers teaching at cross-cultural settings rely on to navigate through adverse circumstances. Future studies can be based on the proposed model (Name-Tame/Change- Gain) to develop 'toolkits' for enhancing resilience strategies.

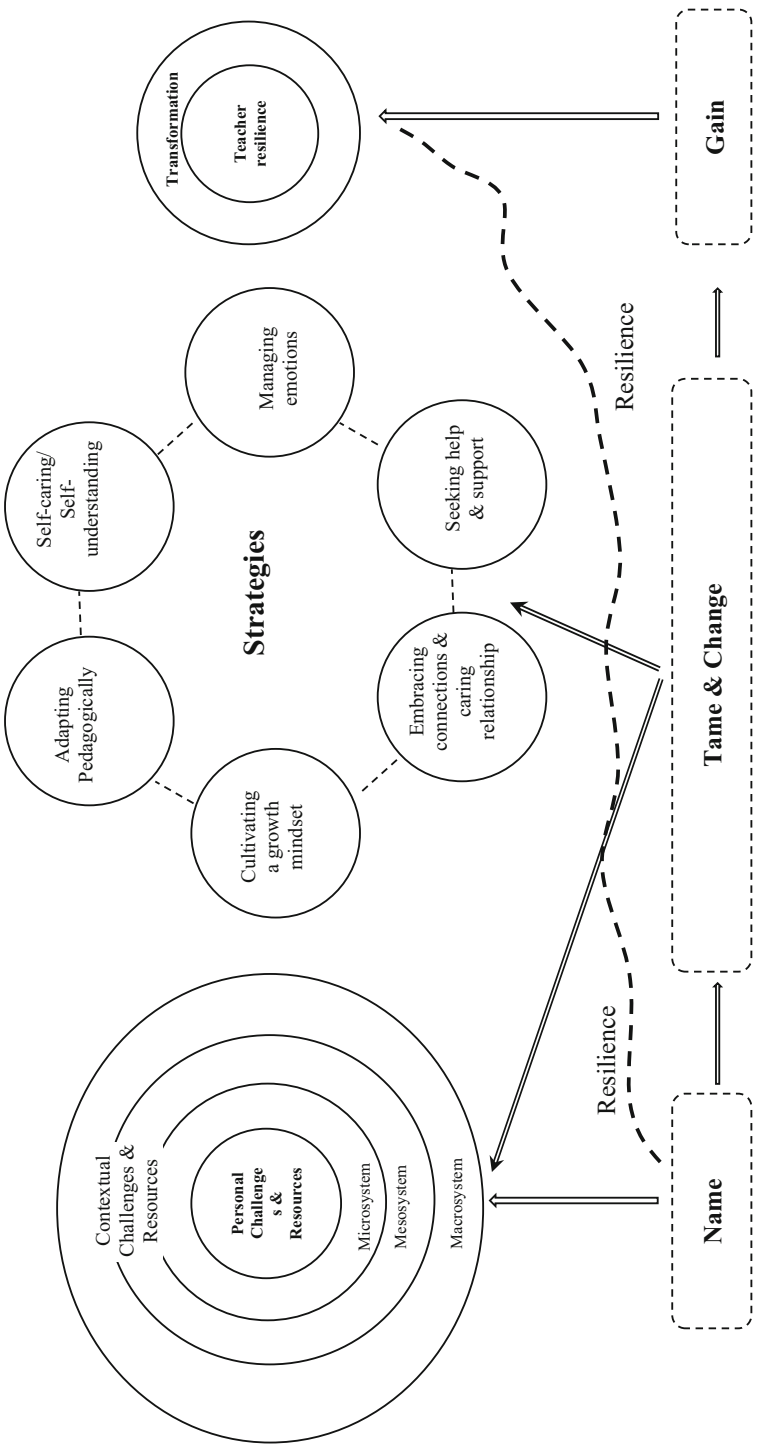

Fig. 1. A model of EFL teacher educator's resilience

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An Investigation on the Teachers' Perceptions on "ICT Integration": Evidence from Indonesian EFL Classrooms

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Abstract. Transforming teaching and learning by increasing use of information technology in classrooms has been the critical issue in most Southeast Asian countries' agenda of teaching reforms, Indonesia is no exception. Since the last few decades, particularly during the Covid 19 pandemic, research conducted all over the world have confirmed that the effective integration of Information and Communication Technology (ICT) in classrooms depend fundamentally on the teachers' ICTs knowledge and skills and their attitudes which ultimately determine how they will implement it in their teaching practices. In Indonesian social and cultural context EFL teaching, the Covid-19 pandemic has contributed meaningfully to the professional development EFL teachers in secondary schools. This paper answers a significant question: what are the teachers' perceptions on the idea of "ICT Integration"? It aims to provide an understanding of the pedagogical adaptation of ICT and transformation to Indonesian secondary school classrooms by examining the impact of teachers' pedagogical beliefs on the use of ICT into the English as a Foreign Language (EFL) teaching and learning practices. This research employed a qualitative approach in order to reveal teachers' views on implementation of the concept of "ICT Integration". Semi-structured interviews were used to collect the first-hand data of various general and specific comments from a variety of teachers of different gender, age, teaching experience, academic qualifications, and social economic backgrounds about their opinions regarding the application of ICT. The empirical evidence demonstrated the teachers' positive feelings about using educational technology in the classroom. The participants also revealed that many teachers were not familiar with the overall concept of new educational technologies. The results of the study show that teachers' pedagogical beliefs are the significant variables in explaining teachers' ICT integration into their English classrooms, implying that an urgent professional development is needed in Indonesia.

Keywords: ICT · EFL teachers · Teacher's perception · Pedagogical transformation · Professional development

1 Introduction

For many years, scholars have studied the factors affecting the use of ICT in the English classrooms. Recent research studies have confirmed that the effective integration of ICTs

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in classrooms depend fundamentally on the teachers' ICTs knowledge and skills and their attitudes which ultimately determine how they will implement it in their teaching practices (Guo et al. 2020; Sit H. W. 2021; Sit. H. W and Guo, S. J 2019; Tso, W. B (Ed.) 2019). Understanding teachers' ICT-related knowledge and skills and their attitude towards ICT is a very fundamental step to establish a systematic framework for the in-service teacher professional development for ICT integration in EFL classrooms. Some researchers argued that how teacher perceives the value of technologies for their teaching and learning has become an important wake up/enabling factor in ICT integration. Baran (2017), for example, discovered that teachers who have positive attitudes toward technology feel more comfortable with employing it and usually insert it into their teaching practices. Other related studies on EFL teachers' attitudes towards ICTs found significant positive correlations between teachers' levels of ICT use and their attitudes towards ICT (R. a. B. Jamieson-Proctor, Paul C. and Finger, Glenn and Watson, Glenice, 2006). They strongly argue that a fundamental reason for studying teachers' attitudes is that it is a significant predictor of prospective ICT use and its successful integration in the classroom.

The purpose of the present study was to examine the teachers' pedagogical beliefs on the use of ICT into the English as a Foreign Language (EFL) teaching and learning practices. The research question of this question is "How do Indonesian teachers perceive ICT integration into their teaching practice in EFL classroom"?

2 Literature Review

Covid-19 has impacted on how technology plays an important role in everyone's lives and has brought teaching and learning environment to a new level. Restriction to a face-to-face teaching and lockdown have boosted the necessity of utilising different forms of technology in ensuring the teaching and learning keeps occurring.

Over the past few decades, the rapid advancement of information communication technology (ICT) has dramatically increased the number of technology use in language teaching and learning. With the internet / World Wide Web creation and progression, for example, teachers now have more options to create effective and innovative use of instructional materials and teaching methods. Hubbard argues that teachers have a pivotal role in the adoption and implementation of ICT in their teaching and learning as they are the key to making learning happen (Hubbard, 2013). With the complexity and the richness of possible learning resources that Internet offers, teachers face considerable challenges to create effective and efficient teaching approaches. The goal of creating such this learning environment is to boost learning outcomes. Education reforms require teachers to adopt new roles as more responsibilities for learning are given directly to the students. This change requires that teachers be proficient in advising and guiding students through more autonomous, self-directed learning processes, while the same time monitoring curriculum standards achieved by students.

A number of recent studies have shown a positive relationship between the use of technology and academic achievement. Scholars and researchers found that students in technology rich environments experienced positive effects on achievement in all major subject areas (Guo et al. 2020). Students showed increased achievement in preschool

through higher education for both regular and special needs children (Kean, Embi, and Yunus 2012). Students' attitudes toward learning and their own self-concept improved consistently when computers were used for instruction (Dela Rosa 2016). Sun and Metros (2011), for example, investigated issues of the digital divide and its impact on academic performance. The results of their study show that students' academic performance is a function of many complex and interrelating factors (Sun and Metros 2011). Although technology use is linked to socio-economic status and academic performance, Sun and Metros suggested that educators should try to identify whether the cause of low or high academic achievement directly results from technology use, and how technology usage interacts with and affects other factors. As a result of multi-factors, some scholars argued that achievement increased not only by incorporating technology, but by also addressing instructional design, software design, and technology capabilities.

In another study, Chan Nim Park and Jeong-Bae Son (2009) investigated factors affecting English as a foreign language (EFL) teachers' use of computers in their classrooms and to find out EFL teachers' perceptions of computer-assisted language learning (CALL) and ways to improve CALL practice in school settings. Participants in the study were twelve Korean in-service teachers of EFL working at secondary schools in Korea. A questionnaire and follow-up in-depth interviews were employed to collect data. The results of the study indicate that the teachers have positive and favourable attitudes toward the use of the computers. They consider computer technology as a useful teaching tool that can enhance ways of teaching by offering students a variety of language inputs and expanding students' learning experiences in real and authentic contexts. It is also reported that external factors such as lack of time, insufficient computer facilities, rigid school curricula and textbooks and lack of administrative support negatively influence the implementation of CALL in the classroom. Internal factors such as teachers' limited computer skills, knowledge about computers and beliefs and perceptions of CALL also seem to significantly affect teachers' decisions on the use of CALL. Based on the findings of the study, implications are made for the effective implementation of CALL in EFL contexts (Son 2009).

The effective integration of ICT is a complex, multifaceted process that involves not just technology, but also curriculum and pedagogy, institutional readiness, teacher competencies, and long-term financing among others (Tondeur, van Keer, van Braak, and Valcke 2008). It is a dynamic process involving interacting factors over time. Frameworks and models have been put in place to ease the numerous aspects of ICT integration, such as ICT and its uses, teaching, the curriculum and schooling (Robertson, Grady, Fluck, and Webb 2006). Based on literature and other research, it also attributed the fact that no guidelines for proper ICT adoption language teaching exist, and most integration cases were done haphazardly with no systematic approach based on existing frameworks or tailored towards the real context in the schools concerned.

Despite its potential benefit in teaching and learning as many researchers have reported, stories regarding barriers and challenges in ICT integration in language teaching and learning still exist. The integration of ICT in language teaching and learning has and continues to experience complex issues. Literature suggests that ICT integration into English classrooms have been weighed down by two types of barriers: external barriers and internal barriers (Tso 2019). External barriers are considered as the key obstacles

containing variables such as adequate access to ICT, Internet access, bandwidth, technology related training available for teachers. The realities in many developing countries, especially in Indonesia as the context of this research, are often problematic and frustrating. The ICT integration in Indonesian schools is still facing serious problems. Schools experience different obstacles and challenges, such as insfrastructure issues (e.g. electricity, computer and Internet availability), school policies, government support, and teacher training (Machmud 2001). However, Ertmer (1999) argues that although external barriers are resolved, it does not mean that teachers would automatically integrate ICT into their teaching practices. Scholars demonstrated that the level of feelings teachers have toward ICT use range from euphoria to uncertainty, to hostility and fear, stress, anxiety depression (Cuervo et al. 2018; Ryan et al. 2017; Von der Embse et al. 2019).

Some teachers show little interest in using instructional technology, while others are obviously resistant to its use. Some people positively accept the concept but feel somewhat bound by lack of training for effective integration (Burgess and Sievertsen, 2020). Still others have ambivalent feelings toward technology. Feelings of uncertainty, hostility and fear naturally lead to many teachers' reluctance or resistance to technological innovation. They will continue to adhere to their traditional practices with which they feel more confident and comfortable. Some scholars believed that the effective use of technology enables teachers to facilitate and adjust their instructional strategies to optimize student's engagement and learning outcomes.

3 Method

Interviews are one of a range of methods intended to gather information that is illuminative and goes beyond the descriptive in order to help researchers understand why people think or act in certain ways or to help explain why something has or has not worked (Menter et al. 2011). The purpose of the interview was to explore disparities between EFL teachers' perceptions of willingness to use technology to support learning and their actual use of it. The interview included identifying any inhibitors and enablers of technology use. In-depth interviews were therefore used to offset the limitations of the survey.

The interview was recorded and conducted in English, but the interviewee could ask for clarification in Indonesian if necessary. Twenty-five teachers agreed and were invited for an in-depth interview to elaborate on their perspective on the definition of ICT integration in EFL teaching. The interviewees were the teachers coming from different background in terms of ages, years of experiences, schools, and qualifications. These backgrounds have helped to enhance and enrich the result of data being elicited. The interviews lasted between 30 and 45 min and were conducted by phone at the teachers' institution. All interviews were recorded and transcribed for analysing purposes.

The interviews were conducted via phone interview with the participants who had given consent for interview. All teachers who participated in the teacher survey were given the option of taking part in the interviews. Those who participated were volunteers who expressed an interest in the questionnaire and who constitute a representative sample of the whole population.

In order to encourage participants in the discussion and excavate as much information as they could elicit, semi-structured questions were used. In addition, this interview

technique included three types of questions: main questions, follow-up questions, and probes. The main questions were intended to focus on the essence of the research problem and to stay on target with addressing the key points of the research problem. The follow-up and probe questions were designed to help ensure that the interview pursued depth, detail, vividness, richness, and nuance. Probing questions included, but were not limited to: *Would you give me an example? Can you elaborate more on that issue? Why do you think it is? Is there anything else?*

These interviews began with the explanation of the nature of the study by the researcher. It included the introduction of the study in general, the objectives of the interviews, the voluntarily principles of participating in this study and language use in the interviews. Participating teachers were then asked to reflect upon their beliefs, attitudes, practices, and experiences of using or not using ICT in their teaching. Questions related to the benefits of ICT for teachers and learners, the current practices, associated problems, desired and needed support, attitudes towards implementing ICT into EFL learning and reasons why they did or did not integrate ICT in their teaching. In order to gain their insights into needs, lesson learned and their perspectives on in-service teacher training, questions relevant to how in-service teacher training helped them to increase their ICT-related skills and knowledge were asked. All the interviews were recorded with the teachers' permission and transcribed for analysis. The interviews were coded using the same categories as in the questionnaire: teachers self-report on knowledge and skills, attitudes, associated problems, current practices, and perspectives on the existing teacher professional development. To avoid misunderstanding and inconvenience due to language problems as mentioned previously, participants were welcome to use both languages, Indonesian and English.

4 Results and Discussion

4.1 Teachers' Perspective on the Definition of ICT Integration

To guide teachers' responses, participants responded to the following open-ended question: *"How have you integrated ICT in your English classrooms?"* along with the probe question, *"How do you define ICT? Please give as many ideas as you can"*. When asked to explain what comes to mind when hearing the word technology, participants had different perspectives.

In the present study, the teachers who had been interviewed made various general and specific comments about their feelings regarding ICT. Generally, there were positive feelings about using educational technology in the classroom. The participants also revealed that many teachers were not familiar with the overall concept of new educational technologies. Moreover, teachers mentioned that they lacked knowledge about the effectiveness of such technology in teaching. They had not fully understood the importance of educational technology. Taking into consideration of the teachers' personal factors it was evident that many teachers feared new technology. The resulting lack of confidence was partly responsible for the low uptake of ICT in the classroom. Underpinning these problems was the fact that ICT policies were imposed on teachers by their educational department. Some educators resented being forcibly included in the ICT integration program just because their school had been selected to participate. Other teachers were

unhappy because they did not have access to ICT facilities at the time most convenient for them to use educational technology tools. In addition, the facilities were only at their disposal at certain times.

The key emerging theme from the analysis of teachers' perspectives on the definition of ICT integration was ICT as teaching aids, ICT as learning resources for students, ICT as research resources for teachers and students, ICT as communication tools, ICT as learning assessment, and ICT as innovation.

4.1.1 ICT as Teaching Aids

In terms of application of ICT in classroom, the majority of the participants described ICT as tools that teachers used to help them with their teaching activities. The tools included personal computer/PC, laptop, projectors, or cameras/video recording. Participants described that they used ICT for presenting information, including, but not limited to a) the use of multimedia presentation software for lesson presentation and as demonstration of learning; b) the use of projectors for showing Websites and other information; and c) the use of document cameras for demonstration, elaboration, and book sharing. However, the participants also strongly argued that technology was only a complement to learning and did not naturally facilitate learning. They considered the teacher's role to be essential, even more critical than the technology itself. Teachers should make the technology fit into the expected curriculum.

> *They can't just use the technology to replace the learning that was taking place, or to replace the role of the teacher in the classroom. Technology is a tool to assist learning.* (Participant 1)

When asked to explain what comes to mind when hearing the word *technology*, participants felt their perspective would be different from those of their students. Some participants saw technology as more than electronic devices. They considered "any tool that can be used to help with learning," TV, clocks, phones, and so forth, to be technology. However, they reported that most of their senior students considered common devices embedded in their everyday lives, such as phones, to be just that, common and not viewed as technology.

This study found that participants who were considered high-end users of technology could become teachers who incorporated a wide variety of technologies, including those on the cutting edge, consistently in their lesson design. Although they indicated that their peers would rate them as high-end users, they considered themselves an average user. They acknowledged they possessed vast technical knowledge base but had yet to find the means to utilise such technologies at an instructional level:

> *I am aware that there's a lot of stuff that I know how to do, and I'm comfortable with doing it; but for some reason I haven't found a way yet that I am quite comfortable incorporating that into the my teaching and learning practice.* (Participant 21)

These participants indicated that technology provided distinct benefits to them as a teacher. Access to newscasts in several forms, both current and archived, which covered a wide range of topics, along with social media platforms like Twitter, YouTube, and

Facebook, enabled them to help students connected what was happening in their daily lives to what they were learning in the classroom:

> *Sometimes I am thinking that like I'm constantly in this process of thinking, 'How can I bring this from the outside to the inside?' and making sure the students enjoy the technology themselves and also seeing it can be beneficial for their lives.* (Participant 18)

The participants also shared the belief that the selected use of technology as a teaching and learning tool should drive the frequency of use. However, they believed that the mere presence of technology did not ensure that learning occurred, as mentioned by one of the participants:

> *Based on my experience, the students learn as it is, technology is not going to help. Its silent reading or independent working that you can do there... Then, all readings you need to read out loud, the story, and then have them read to each other. It works better, I've found.* (Participant 1)

Teachers should use technology as a tool to enhance or fortify their curriculum planning and instructional repertoire. Another teacher was also cognisant of the necessity to gradually incorporate technology in response to the range of student technology skills.

4.1.2 ICT as Learning Resources for Students

The participants also defined ICT as learning media and resources that students could use. Learning by using ICT was described as any type of learning facilitated by technology or by instructional practice that was significantly different from the format of traditional type or could be the combination of both. Using ICT in teaching and learning occurred across all four major language learning components (listening, reading, writing, and speaking) and other various types of learning activities. For example, participants illustrated some examples of the use of technology in teaching reading. The participants described the use of ICT for reading in formats other than traditional printed texts. Some participants reported that they taught reading by including online texts, visual text, eBooks, text supplemented by audio reading, blogs, and books on tablets.

Another example of using ICT as a learning resource that was given by the participants was as a supplement or replacement of an existing activity. They described the use of ICT to replace activities that were already being conducted with pencil and paper, and the use of ICT for activities that improve an existing activity and support instruction. For example, when a teacher assign students a quiz or test by using ICT, the visualisation of the assignment could be improved with some colourful pictures to improve the students' motivation and increase their understanding.

Participants also illustrated ICT as a tutor. They interpreted the use of ICT as student tutors. With the use of educational software, online tutorials, websites, and games, students could now be facilitated and supported when they did independent learning activities, such as homework or projects. Students could search for individual resources to accomplish their assignments by browsing through websites. Students might have

advantages by finding additional materials that had not been discussed in-depth during classroom activities but were available by accessing the Internet.

In one of the examples of participants' comments on using ICT in major language skills learning, ICT could be defined as a tool to help students' writing activities. The participants reported that ICT was a tool to help students with traditional writing, digital story writing, interactive writing, creating photo stories, editing, revising, learning the writing process, and as a tool for writing to real audiences. Using ICT for writing activities helped students to explore the available resources and expand their creativity. Even though teachers perceived their own ICT-related knowledge and skills was limited, they realised that students were able to employ the tools and the teachers' task was to trigger students to explore it.

Participants perceived that students' unequal technology ability levels could become a significant restriction to using student-centred technology in the classroom. Students with more resources and skills on ICT tended to produce high standard assignments and greater output than those with limited ability. They went on to indicate how the physical layout of the school and relatively short class periods were also significant barriers in developing and implementing student-centred, technology-based activities, for example, as captured below. Therefore, some teachers felt that ICT could not replace teachers, as discussed in the previous discussion.

> *Can you imagine how difficult to handle 30 – 40 students in a class where they have different abilities in terms of their language ability as well as their ICT capability?* (Participant 8)

Despite ICT being valued as learning resources by students and being acknowledged that it could help improve EFL teaching, a few teachers argued that the effort in spending time preparing the material was not as worth as benefit gained by the students.

> *There are good programs that might be used, but are they going to get much benefit out spending a lesson on that? They don't get much benefit from having a lesson on that, and then it's a lot more work.* (Participant 4)

4.1.3 ICT as Research Resources

ICT was also described as resources both for teachers and students for research on any topic. Teachers described technologies as most commonly used path to have students conduct online reading and to do more in-depth research online in a particular subject/topic they were assigned. It was also commonly found that teachers used technologies to facilitate students to access and submit assignments online. There were some more interactive online learning activities, such as creating YouTube videos, online learning websites, engaging in online discussions, and editing work using collaborative platforms, such as Google Docs and Google Forum. Publishing was another example of the tasks performed by the students. Using WordPress or Blogspot platforms was quite common in most urban schools where the Internet was more reliable than for their peers in rural areas. Not surprisingly, teachers thought that students from urban schools had more advantages by gaining updated knowledge and skills than those in rural areas.

One of the good things about implementing ICT in your classrooms is that students have plenty of resourceful learning where they can access collaborate with others. (Participant 2)

4.1.4 ICT as Communication Tools

Another interesting finding in this study was using ICT as communication tools between students and teacher, or among students to promote collaboration work. Students interacted with the teacher during the instruction/classroom activities and outside the classroom when it became their homework activities. This process developed stronger teacher-student relationships due to their communication being not limited to school hours.

4.1.5 ICT as Learning Assessment

Participants described ICT as the tools to assess students' fluency, comprehension, and other knowledge and providing immediate and effective feedback. The participants justified that ICT could support assessment in many different ways such as following up on student assignments and reviewing their progress over time. A few participants also added that the ICT could be utilised to assist formative assessment; helping to boost engagement, pinpoint knowledge gaps, and support further/deeper learning.

A few participants also elicited that another benefit of ICT as the tools of assessment was that it provided the learning environment to be more flexible. Students could access and complete online assessments or regular tasks through the Internet and computer from home at a time that best suited their individual learning style and needs. All they needed to ensure was that they had an Internet-ready device or a web-based environment. As one participant stated:

Students are responsible for their work. From what my assessment, I can see that their grades have improved. I send home a weekly reading/writing assignment. It has reading lessons for the week. Work is completed at home and returned every Friday. (Participant 22)

4.1.6 ICT as Innovation

Interestingly, ICT were also defined as innovation. Although only a minority of participants mentioned this benefit, ICT had been regarded as an innovative way to teach students to critically examine information as they questioned, located, synthesised, communicated, and attempted to comprehend online.

The different varieties of ICT were identified during the study, including the use of YouTube videos as a presentation form for students' projects, WordPress for students' project publication and the use of an interactive whiteboard or language laboratory for language drills and practices. Although not many participants had confidence in using ICT to facilitate students' collaborative work, they believed that using ICT could empower students' autonomy, provide opportunities to collaborate with peers, and ultimately improve students' readiness for assessment.

5 Conclusion

This study revealed that teachers perceived that they applied the knowledge they acquired to their pedagogical practices. However, in fact, this goal was not achieved. The data elicited from the interviews confirmed what Schumez (2005) stated when he indicated that using computers does not mean developing computer pedagogical content knowledge and skills. Teachers expressed that using ICT in the language learning process was linked to the lack of support from their own institutions and from the government. The responses in this study also indicated that many teachers were having difficulty finding ways to support their students in learning the language. Additional findings suggested that teachers needed specific preparation in working with English language learners. They need to know who the students are and what their prior education experiences were like. Moreover, teachers need to know how to deliver sheltered instruction, to teach content to English language learners in strategic ways that make the concepts comprehensible while promoting the students' academic English language development.

Based on key findings and limitations of the study, several suggestions for future research have been identified. As stated, in the limitations of the study, future studies might be conducted with a larger sample size, with objective measurement, and covering more secondary higher education institutions in different areas of Indonesia. Future research could also adopt a longitudinal design to gain more insights from the EFL teachers regarding the use of ICT in their teaching and learning practice, perhaps involving an intervention on professional development aimed at enhancing ICT use for teacher educators.

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