LONG PAPER

What are tutors' perceptions of an online tutoring project—Digital Learning Companion—During the COVID-19 pandemic? A case study in Taiwan

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Abstract

The COVID-19 outbreak has had serious impact on remote education and service-learning implementation in Taiwan. To alleviate these impacts, the Digital Learning Companion, an online tutoring project, was proposed to bridge the digital divide and learning gap among remote children, while offering university students an online service-learning environment. This project recruited international students as tutors for local children. To explore tutors' perceptions of this project during the COVID-19 pandemic, qualitative research, particularly a case study, was conducted. Adopting purposive sampling, 15 participants were chosen for interviews at the end of the project, and 10 reflective videos were used to reveal further information to supplement the interview results. Content analysis was employed to analyse the data. The findings implied that using JoinNet and tutoring journals significantly facilitated the tutoring process, which led to tutors' remarkable development in skills, social relationships, multicultural experience, altruism, social responsibility, self-efficacy, and affective values. However, they encountered some challenges, such as technical problems, communication barrier, lack of tutee information, and short tutoring duration. The solutions to these challenges and insightful suggestions for the project development are pointed out. The results of this study contribute to tutors' cognitive, social, and motivational development, and support the online service-learning-integrated curriculum, which can become a reference for further studies regarding online service-learning implementation to bridge the research gap.

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Graphical abstract
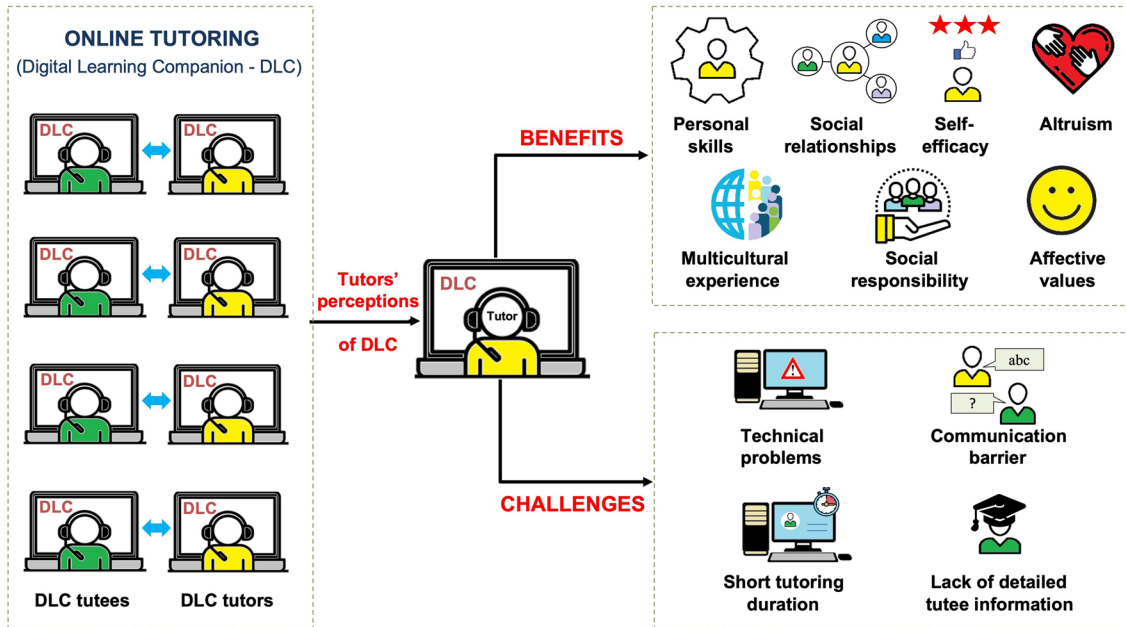
1 Introduction

The higher education curriculum strongly emphasises experiential learning to integrate academic knowledge with practical skills. Service-learning (SL) is typical experiential learning in which students get involved in professional, social, and civic activities to foster learning, development, and community connection [1, 2]. Given the potential, SL has been an effective strategy to orient students to whole-person education, increase communication between service providers and recipients, and fulfil community needs. With the advance of technology, SL was transformed into online learning, leading to the proliferation of e-service-learning or online SL [3]. The outbreak of the COVID-19 pandemic and lockdown measures has forced schools to close their premises and nations to close their borders [4], so most schools have significantly changed from traditional learning to remote learning [5], and online SL projects have emerged [6] during the pandemic, especially in remote areas.

As mentioned by ChanLin et al. [7], remote areas in Taiwan have restrictions in terms of space, human resources, and distribution of educational materials compared to urban regions, leading to low learning outcomes. A variety of supplementary education approaches exist to help them have better learning conditions. The Taiwan Ministry of Education has promoted online tutoring (OT) projects in the form of online service-learning (SL), known as the OT for After-School Learning Project, to offer remote students authentic educational opportunities and college students the opportunities for SL practice to help the community [8, 9]. There is a growing evidentiary base indicating the benefits of OT, such as changing tutees' learning achievements and attitudes and increasing college students' satisfaction, engagement, and experience [7, 9–11]. However, the research has been mostly restricted to interaction between local children and local college students or pre-service teachers [8, 12], leading to a lack of international exposure, which is requisite during the internalisation integration.

Furthermore, the spread of COVID-19 has restricted national schools' connection with other countries; consequently, students from disadvantaged backgrounds could not find a way to access alternative learning opportunities and international exposure [4]. According to Al-Ansi [13], the only approach to enable the continuity of education during COVID-19 is online learning, so virtual programs are essential for students worldwide to continue learning in response to the lockdown and quarantine measures [14, 15]. Although online learning is not new, the transition from traditional learning to online learning during the pandemic causes the change and restructuring of policies, methods, applications,

and infrastructure to fit the learning culture [13]. COVID-19 has revived the need to examine the opportunities of online learning [16]. Parmaxi and Zaphiris [17] indicated that integrating technology, culture, and learning into designing online environments is necessary; thus, this integration should be considered in OT to help students learn better and have opportunities to be exposed to different cultures.

Universities in Taiwan have attracted many international students, and the number of international enrolments accounted for 10% of the total of Taiwan's university and college students in 2018 [18]. According to Yang et al. [19], experience abroad can be challenging, especially when students need to adjust to the host culture. The cultural gap between the host and home countries can lead to cultural shock, stress, and adjustment difficulties [20]. In addition, interacting in the host language with suitable communicative styles is a challenge. When international students come to Taiwan, adjusting to a new culture and interacting with others in a new environment could be challenging for them due to cultural shock and language barriers. It is therefore essential to offer effective means to communicate with the locals and to learn some useful information that might help them survive in a society with a different culture from what they are accustomed to [21]. Gholami Pasand et al. [22] specified that computer-mediated communication could facilitate students' learning and interactions with people from different cultures, so using computer-mediated communication can be a potential way to connect international students with local people during the COVID-19 outbreak.

To address these issues remaining in remote areas, and to provide international students with a connection with the local people, the Digital Learning Companion project (DLC), an online tutoring project, was proposed in this study. Differing from previous projects in Taiwan, DLC has the participation of international students at undergraduate and graduate levels as tutors for remote children, which can encourage authentic learning opportunities and international exposure for local remote children, and online SL practice and local connection for international students. Although Otangaa et al. [21] conducted a study of the DLC, the focus was on international graduate tutors' experience and cultural awareness. Very little is currently known about students' perceptions from a holistic perspective [23]. Levin et al. [24] posited that perception plays a decisive role in evaluating the effectiveness of online social work education, but the empirical research on how undergraduate and graduate tutors perceive OT in the DLC is relatively sparse. Thus, this indicates a need to understand their perceptions to help the administrators comprehensively understand the SL project to drive better decisions about incorporating SL into future higher education curricula.

When implementing a project, assessing student outcomes from technical and humanistic perspectives is essential to ensure project sustainability [25]. Furthermore, the extent to which the online delivery platform is functional and easy to use, organisational and technological infrastructure, and the facilitating conditions can shape their perceptions [26, 27]. However, it is still unknown how the DLC tutors perceive the platform. Moreover, apart from what they got, how they performed is essential to be examined, but there is currently very little research related to the DLC. To bridge this gap, undergraduate and graduate international tutors' perceptions were investigated to explore what they perceived as the benefits and challenges related to technical and humanistic aspects, and how they got them in this study. Also, their suggestions were used for further improvements of the project. A qualitative design was utilised to gain a profound understanding by addressing three research questions (RQ):

RQ1 What are the stages that tutors engage in when producing OT sessions?

RQ2 What do tutors perceive as the benefits of this project?

RQ3 What do tutors perceive as the challenges of this project? What are their suggestions for project improvement?

2 Literature review

2.1 The integration of service-learning into the higher education curriculum

Service-learning (SL) is academic learning combined with community service [11] to offer students the opportunity to apply theories to real-world problems [28]. SL is considered a successful educational strategy that integrates service activities into the higher education curriculum, supports innovative and novel teaching approaches to monitoring students' learning, and recognises civic responsibilities [29]. Such SL is considered a version of whole-person education to help students gain knowledge and be involved in the community [11].

Salam et al. [29] implied that the most prevalent theory underpinning SL-integrated curricula is the experiential learning theory developed by Kolb [30], which emphasises learning as the process of knowledge accumulation through experience with the learning cycle, including concrete experience, reflective observation, abstract conceptualisation, and active experimentation. Learning is constructed by the merging of having experience and transforming it. Therefore, students could connect their experience to class concepts while developing community knowledge through SL, thus enhancing their performance [29]. SL is firmly grounded by social constructivism and sociocultural theory

proposed by Vygotsky [31], highlighting the individual's cognitive growth mediated by social interaction and culture. Lantolf and Thorne [32] confirmed the vital role of social interaction and culture by indicating that learning is the knowledge-constructed process deprived of experience from cultural, linguistic, and historical contexts. Thus, SL assists students in building knowledge through social interactions and cultural exchange.

SL is well known in higher education, and its potential extends across different disciplinary areas. SL enriches students' requisite skills, including communication, collaboration, critical thinking, problem-solving, social awareness, social responsibility, and even multicultural competence [29, 33]. Despite these merits, some obstacles to implementation and sustainable development exist, comprising the institution culture and a shortage of involvement and preparation [34]. SL implementation requires considerable time to plan, arrange, and integrate creatively and effectively. Therefore, SL should be well-designed based on the above theoretical frameworks and have good practice guidelines to help educators overcome these challenges.

Recently, considerable literature has focused around online SL, and the transformation of both SL and online learning by removing geographical limitations from service activities [3]. The spread of the COVID-19 pandemic has challenged SL implementation, resulting in the emergence of online SL projects [6]. As mentioned in previous studies, remote students are disadvantaged regarding learning outcomes, literacy, experience, motivation, and cultural stimulation compared to non-remote students [9, 12]. Online SL provides access to learning in a geographic, sociocultural, and economic setting [35] which is feasible in remote areas. Such online SL in disadvantaged regions can become a solution to bridge the digital divide and the learning gap for remote students and to give college students SL practice [3].

2.2 Online tutoring as the transformation of SL and online learning in Taiwan

Online tutoring (OT) is a form of personalised learning support by a tutor to a single tutee (person-to-person) or small group of tutees (person-to-group) by using communication technologies [36] to access supplementary education. OT belongs to synchronous computer-mediated communication offering novel educational opportunities and enabling direct teacher-student interaction [37] and brings more convenience for tutors and tutees than face-to-face tutoring [38]. According to Chappell et al. [39], OT can reach remote students by offering synchronous, one-to-one, and real-time services, giving tutors real-world experiences to develop their abilities, enhance language and communication, and exchange cultures [21]. Thus, OT can bridge the digital divide and learning gap for remote children [9], and implementing OT projects in remote areas can facilitate their learning during the pandemic.

Given the potential of OT, person-to-person OT or one-on-one OT, the tutor–tutee interaction mediated by an online delivery platform enabling tutors to give tutees feedback, such as videoconferencing [40], has been widely adopted in Taiwan. The Taiwan Ministry of Education proposed OT as the form of SL in an online learning medium named the OT for After-School Learning Project in remote areas. When joining OT, college students can produce authentic output to help remote children. Thus, it is crucial to understand the benefits of OT so that policymakers can make better decisions when incorporating it into higher education.

Videoconferencing, the transmission of sound, vision, and data signals between two or more places to enable simultaneous interactive communication [41], has been widely used in OT. Its numerous benefits to support learning are highlighted, such as enhancing students' performance and achievement and promoting cultural exchange and understanding of students from various groups [42]. Videoconferencing in OT makes students better engaged in activities compared to traditional learning [11]. Furthermore, the COVID-19 crisis has led to an increase in videoconferencing [14], which has become an alternative connection in disadvantaged areas at a reduced cost [43]. Based on previous studies, videoconferencing is an effective way to communicate, exchange ideas, strengthen community ties and make international connections feasible in remote areas; thus, videoconferencing was explored in this current study.

2.3 Relevant studies of perceptions in the digital learning environment

As suggested in the literature, students' perceptions started to change when provided with distance learning opportunities [44]. E-tutors reported positive perceptions of OT, especially towards teaching preparation, and were eager to continue future projects [10, 45, 46]. Some technological factors, including stability of equipment, technical support, substitute plans, environment availability, self-efficacy, usefulness, ease of use, supportive cultural practices, and even technical problems, affect perceptions [45, 47]. For example, technical issues (i.e. sound cuts, freezing images, and communication cuts) can lead to negative perceptions. Identifying these factors can shape students' perceptions and help to deliver better lessons.

DLC is an OT project with the participation of international tutors during the COVID-19 pandemic, but there remains a paucity of evidence on DLC tutors' perceptions. In addition, according to Wang and Sun [5], most of the prior studies have focused on challenges when transitioning to online education with the lack of internationalisation.

Therefore, this study focused on what international tutors perceived as benefits and challenges from both technical and humanistic views to bridge the gap. Exploring perceptions could help tutors realise their development and administrators understand the project effectiveness to make suitable adjustments for future growth.

3 Methodology

Given the aforementioned research gaps, this study investigated tutors' perceptions of the benefits and challenges of the DLC through a qualitative approach. The rationale underlying the use of this approach is providing vivid and richly in-depth explanations from human experience [48]. Specifically, the case study was used in this study because it can offer a comprehensive, holistic description and explanation, which is a useful approach to studying educational programs [49].

3.1 The Digital Learning Companion project

The DLC is an OT project supported by the Taiwan Ministry of Education to recruit international students as tutors for remote local children. The DLC was designed based on experiential learning theory as the main theoretical framework to offer university students experiential learning opportunities, social responsibility practice, and local children authentic learning opportunities during the COVID-19 pandemic. There were four weekly classes: Monday, Tuesday, Wednesday, and Friday, with each session lasting two hours. There was one-to-one tutoring, and videoconferencing was used to tutor for 10 consecutive weeks. Tutors were equipped with personal webcams and headsets to have videoconferences in different computer labs. Due to the pandemic, there were a limited number of tutors in each computer lab.

Regarding the learning platform, JoinNet is an interactive whiteboard which allows tutors and tutees to chat, browse the Internet, etc. Following the certain framework, each tutor designed slides based on the given weekly topics, such as food, clothing, etc., to foster local children's communication.
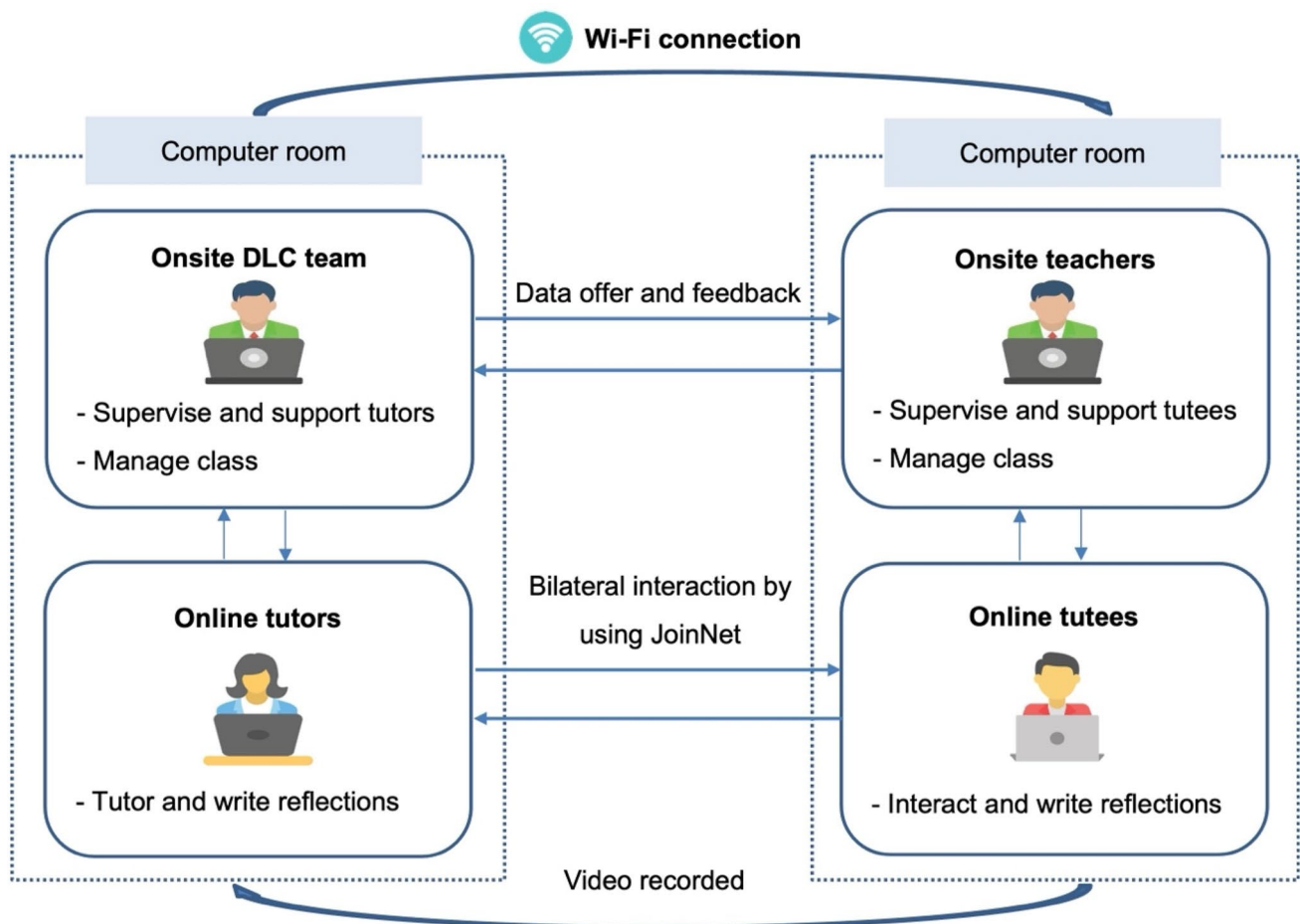

Fig. 1 The online tutoring system

There were a DLC team (tutors' side) and teachers (tutees' side) as supporters and supervisors to observe and assist them in each session. All sessions were videotaped and reviewed by the DLC team to ensure quality. Figure 1 demonstrates the OT system.

3.2 Participants

There were 68 international tutors following the undergraduate and graduate programs at different universities in Taiwan participating in the DLC. To become DLC tutors, all participants had to pass the computer test and interview to meet the requirements of the DLC project. Regarding the computer test, they were given an operational video to guide them on using the learning platform JoinNet one week before the testing day. Then, they were asked related questions about how to operate JoinNet (e.g. how to log into the system, upload the tutoring PPT, and browse the Internet, etc.) by the DLC team. This test not only assessed how they operated the platform but explored their personality, work behaviour and self-learning ability. After finishing the computer test, the project director interviewed the participants to collect in-depth information about them. The content of the interview focused on their tutoring experience (e.g. how many years they have taught/tutored, what methods they used for teaching/tutoring, how they motivated students to learn and solved the arising problems in class, etc.), and their language proficiency such as English and Chinese. The potential participants were chosen to become the DLC tutors based on their performance in the computer test and interview results.

Purposive sampling was used in this study. Fifteen participants (three to four tutors of each class) were chosen for interviews to represent all tutors. These participants were experienced tutors (joining the DLC for at least two semesters), who had to tutor for 10 weeks and join all sharing sessions. The tutors followed different undergraduate and graduate programs from various disciplines such as Applied Foreign Languages, Chemical engineering, etc., and diverse nationalities, including French, Kenyan, etc. They were then contacted by the DLC team and interviews with the researcher were arranged. Table 1 presents the background of the participants.

3.3 Instruments and supportive resources

Interviews are one of the critical data collection strategies that allow a complete description of the participants' experiences and viewpoints on a phenomenon [50]. Therefore, interviews were employed to gain better insights into their perceptions and suggestions for project enhancement. The interview was semi-structured because of including open-ended questions allowing for spontaneous and detailed responses [51], and the content was partially based on the context and participants' responses. A total of 15 interviews with tutors were conducted. The interview protocol used in the study modified from ChanLin et al. [8] is illustrated in Table 2.

Students were directed to integrate their knowledge, ideas, and feelings accumulated from the learning experience through reflection [52]. In addition to the interviews, supportive resources from reflective videos were used for qualitative data analysis. Ten random reflective videos were integrated into the data analysis, revealing further information to supplement the interview results.

Table 1 Interviewees' background

Coding	Gender	Nationality	Program	Department	Times of participation
I1	Male	French	Undergraduate	Mechanical Engineering	2
I2	Female	Vietnamese	Graduate	Materials Science and Technology	2
I3	Female	Vietnamese	Graduate	Applied Science	2
I4	Female	Indonesian	Undergraduate	Chemical Engineering	2
I5	Male	Vietnamese	Graduate	Electrical Engineering	3
I6	Male	Vietnamese	Graduate	Applied Science	2
I7	Female	Indonesian	Graduate	Digital Learning and Education	2
I8	Female	Indonesian	Undergraduate	Business Administration	2
I9	Female	Paraguayan	Undergraduate	Business Administration	2
I10	Male	Indian	Graduate	Automation and Control	2
I11	Female	Indonesian	Graduate	Electronics and Computer Science	3
I12	Male	Kenyan	Graduate	Digital Learning and Education	2
I13	Male	Vietnamese	Undergraduate	Chemical Engineering	2
I14	Female	Vietnamese	Graduate	Applied Foreign Languages	3
I15	Female	Indonesian	Undergraduate	Industrial Management	2

Table 2 Interview protocol

| Interview questions |
| --- |
| 1. What stages are you involved in when producing OT sessions in the DLC? |
| 2. How do you experience the DLC project? Please indicate the components you consider helpful and give specific examples. |
| 3. What are the challenges you have encountered in the DLC? Please describe which part is not helpful, and give specific examples. |
| 4. How did you deal with the challenges in the OT? What are your suggestions for future improvement of the DLC? |

3.4 Data collection procedure

The DLC recruited international students as tutors. There was an orientation for them to understand the objectives, and then, the director interviewed them. After passing the computer test and interview, they became the DLC tutors. They were asked to join the educational training instructed by the experienced lecturer for three hours to familiarise themselves with the learning platform JoinNet (e.g. how to use JoinNet more deeply and solve the arising problems when using it, etc.) and the approaches to designing materials. Afterwards, each tutor was randomly paired with one remote child.

Before the first lesson, participants were informed of the study objectives and agreed to sign the consent form. The procedure involving human participants accords with the ethical concerns proposed by Fraenkel et al. [53], including confidential identities, respectful treatment, and no physical or psychological harm to participants. Videoconferencing was used to tutor for 10 weeks of consecutive sessions, each lasting for two hours. After the final session, all tutors were required to record a reflective video (three to five minutes) to express their thoughts. Interviews were conducted at the end to provide insights into the results. The interviews took place in the research room, with each session lasting for one hour. Each participant was asked some background questions and four open-ended questions with some follow-up questions. The data collection procedure is illustrated in Fig. 2.

3.5 Data analysis

The information from interviews and reflective videos was coded for analysis, and pseudonyms were assigned to each
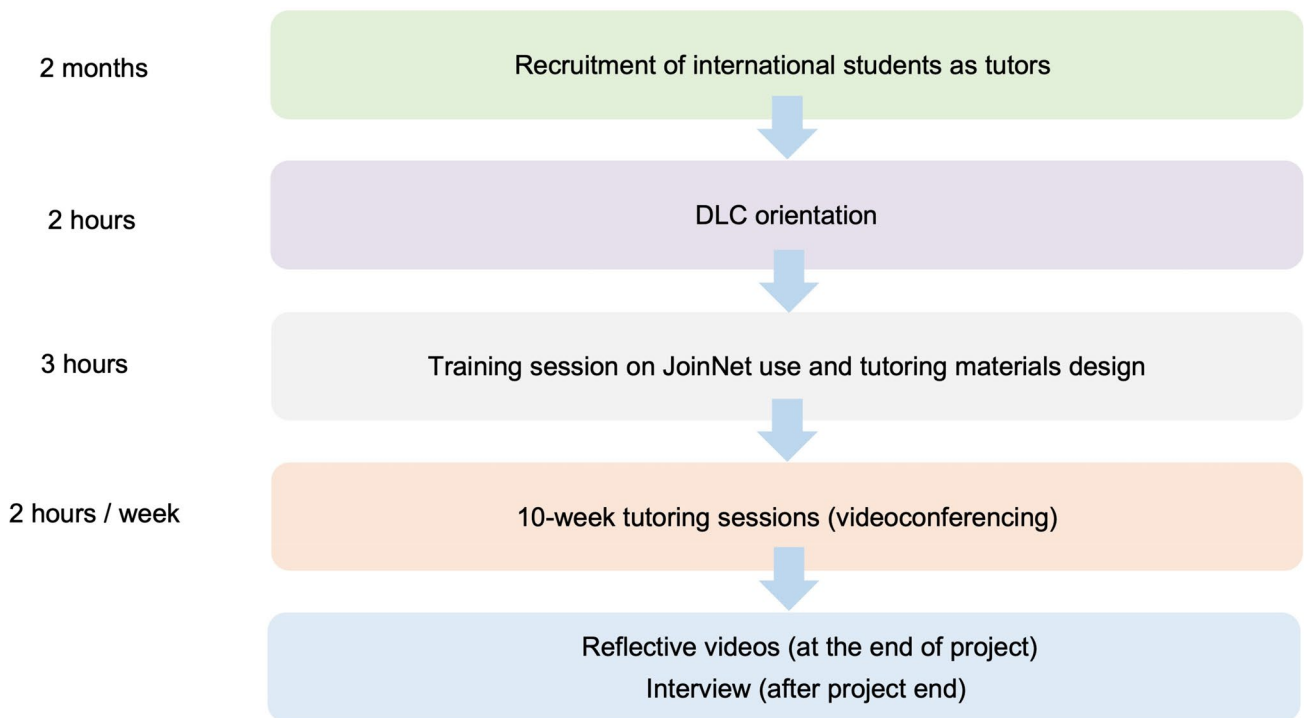
Fig. 2 The data collection procedure

participant to ensure confidentiality. Based on the sampling selection, the results were coded with two-part codes: (a) Interview order (I1->I15), or Reflection order (R1->R10), and (b) Program (1: undergraduate, 2: graduate). For example, the coding of I1-1 indicated that participant 1 was taking an undergraduate program.

Interviews were recorded, and non-verbal behaviours and facial expressions were noted during the interview. Then, the interviews were transcribed verbatim, and a copy of the transcript was sent to each interviewee to review and verify the accuracy of the data captured in the transcript. Content analysis by Patton [54], including coding, categorisation, description, and interpretation, was employed for data analysis. The data were coded and interpreted by two researchers with five years' experience of content analysis to ensure the objectivity and interrater reliability of the coding results. The verbal protocols were read many times before coding, and labelling categories were assigned to prevent possible invalidity of the coding content [55]. The interpretation was based on hermeneutics and phenomenology by Patton [54], emphasising the cultural context and experience.

The coding scheme was developed to code tutors' perceptions regarding three areas: (a) procedure, (b) benefits, and (c) challenges, as illustrated in Table 3. There were a few differences in the two researchers' coding, but they were resolved to reach complete agreement after discussion. The interrater reliability was 0.9.
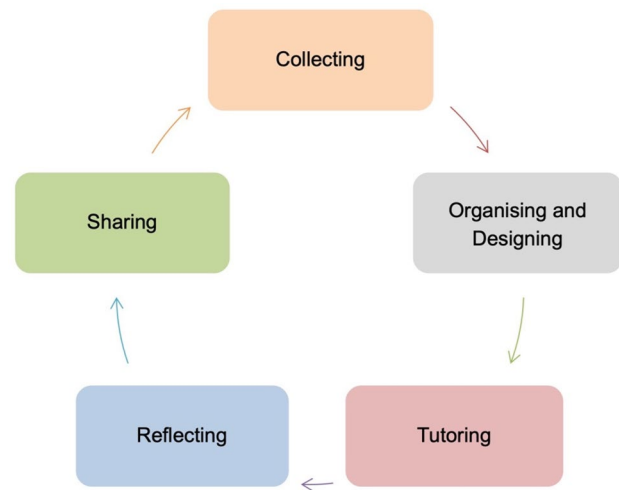

Fig. 3 The processes of the online tutoring session

4 Results

4.1 Tutors' engagement in producing online tutoring sessions in the DLC

Based on the interviews, each tutor went through five steps: collecting, organising and designing, tutoring, reflecting, and sharing, when producing OT lessons. Figure 3 demonstrates the OT processes.

In the first phase, Collection, tutors found and gathered materials based on the weekly topic. They could self-find

Table 3 The codes of tutors' perceptions

Category	Themes	Terms extracted in data resources
Procedure	Collecting	Searching materials, worksheets, images
	Organizing and designing	Planning, designing, integrating words and images
	Tutoring	Chatting, communicating, discussing, adjusting, coping problems, strategies
	Reflecting	Journal writing, assessment
	Sharing	Counselling, feedback, benefits, challenges, strategies
Benefits	Multi-functionality of JoinNet and tutoring journal	Interactive whiteboard, browsing the Internet, chatting, giving stickers, drawing, assessment, reflection
	Personal skills	Online tutoring, strategies, adjustment, designing, integrating, time-management, problem-solving, language
	Social relationships	Relationship, friendship
	Multicultural experience	Taiwanese culture, own culture, other cultures, similarities, differences, values, culture exchange
	Altruism	Love, caring, concern, sympathy
	Social responsibility and self-discipline	Preparation, commitment, reflection, review
	Self-efficacy and affective values	Self-confidence, experience, satisfaction, appreciation, growth
Challenges	Technical problems	Unstable connection, slow computer, freezing
	Communication barrier	Misunderstanding, no understanding of Mandarin
	Lack of tutees' detailed information	Level, personality, characteristics, interest
	Insufficient tutoring duration	Short time, time reduction

the materials or follow the DLC resources. An example is given below.

> Based on the weekly topic, I searched the materials on the Internet, such as worksheets, games, etc. Sometimes, I chose some materials from the DLC resources. I preferred to select bilingual content to help my student quickly understand the lesson. (I7-2)

The second stage is Organising and Designing, in which tutors decided what content to use and how they designed their sessions after finding materials. All tutors had to upload materials before each session. Then, they were reviewed by the DLC team. If the materials did not fit the framework, the team would give tutors feedback to revise them. An example is reported as follows.

> I needed to prepare materials and upload them to Drive for review. I used Mandarin and English when designing PPTs. Sometimes, supporters helped me modify the Chinese content to suit my tutee. (I6-2)

In the third step, Tutoring, each tutor delivered the OT through JoinNet. They uploaded the materials to JoinNet, used its functions to tutor, and adjusted the materials to meet tutees' needs.

I adjusted the tutoring strategies based on my tutee's understanding. When he did a good job, I would give him a sticker. (I5-2)

Figure 4 demonstrates the interface of JoinNet.

In the fourth stage, tutors had to write the tutoring journal to evaluate the lesson after tutoring. They needed to write the reflection and assess their own and tutees' performance based on a 5-point Likert scale.

> After tutoring, I needed to write a reflection to assess my student's performance and myself. I think it's a good way to reflect on what I have done. (I9-1)

Figure 5 describes the journal interface.

In the final step, tutors were required to share their experience after the sessions, for example, the strategies and difficulties during the lessons. They could give and receive feedback and consultation from other tutors and the DLC team. An example is provided below.

> In the end, we formed a small discussion group and shared with others our difficulties and solutions. Some tutors suggested practical ways to find materials, and I applied them to my next lesson. (I10-2)
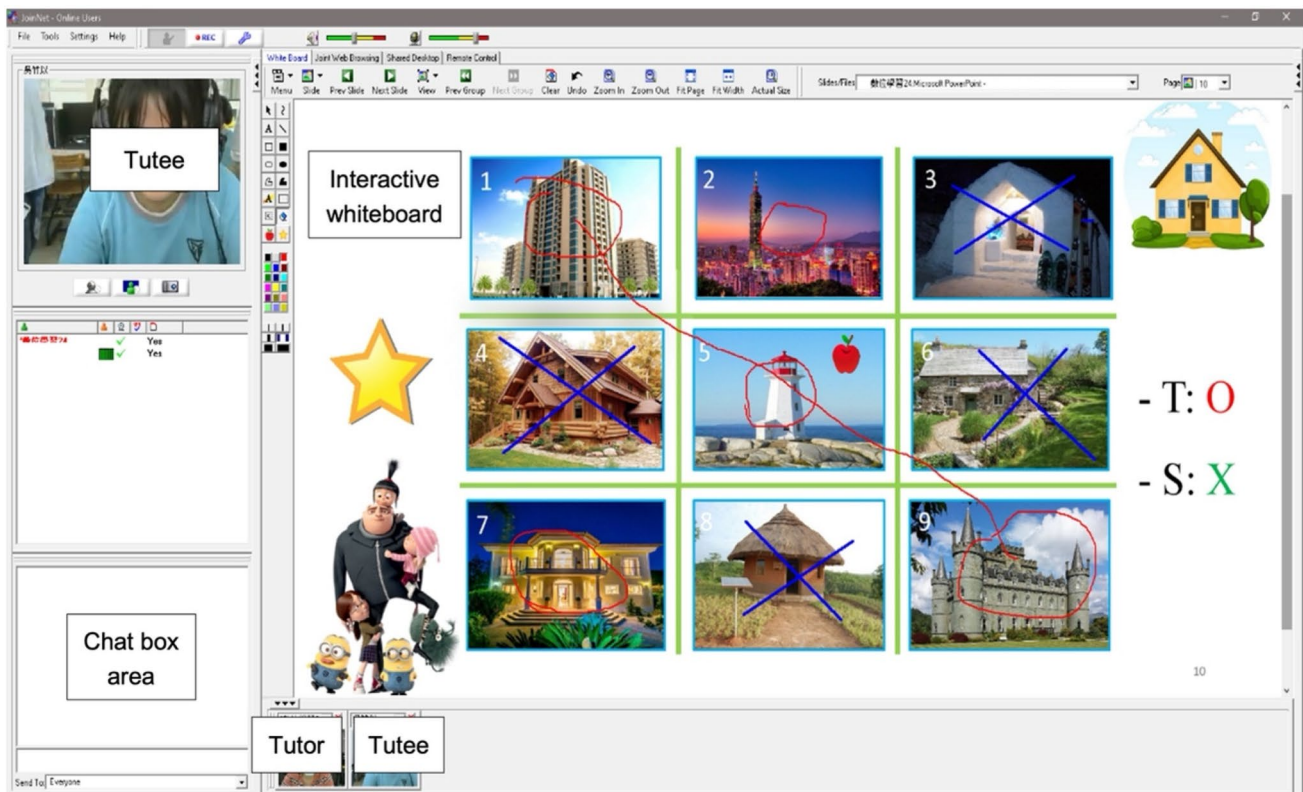

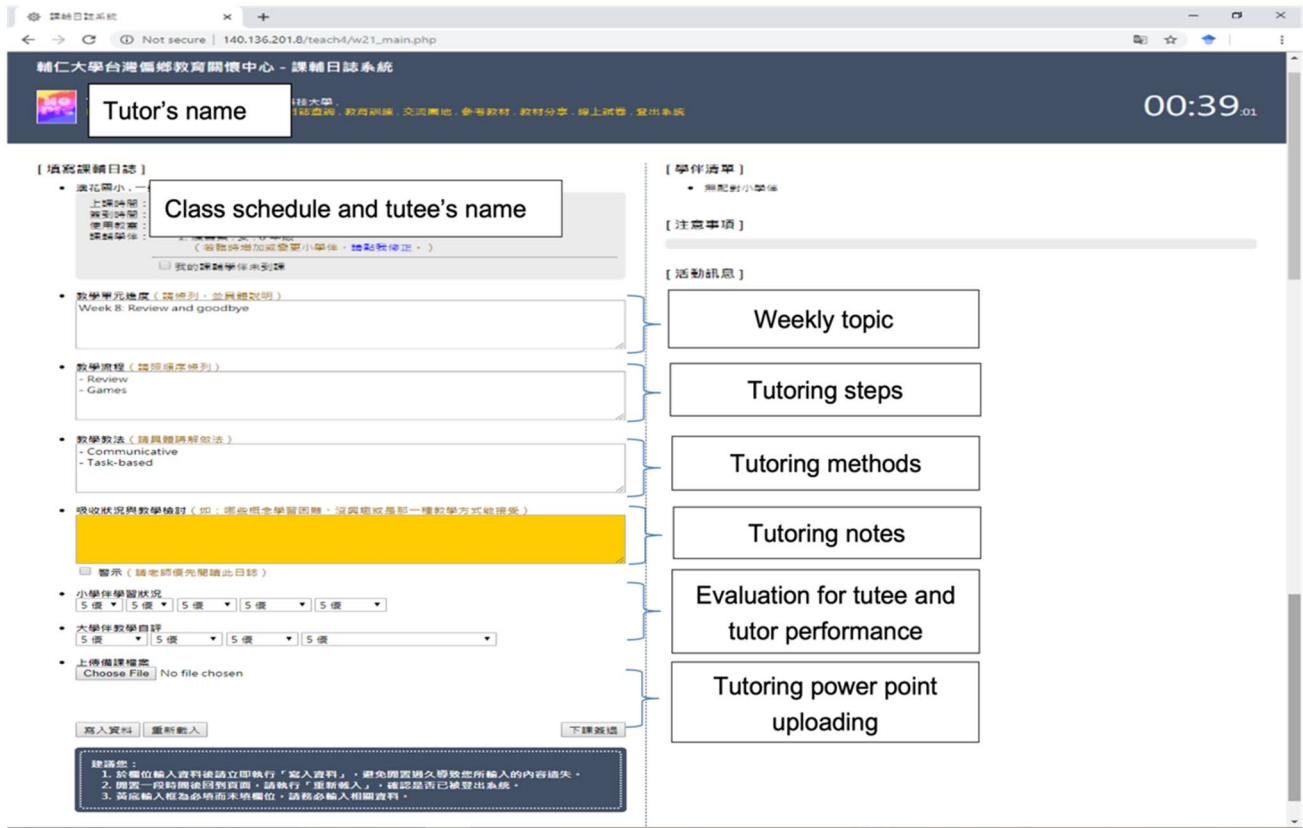**Fig. 4** The interface of the communication platform—JoinNet

Fig. 5 The interface of the tutoring journal

The tutoring processes were illustrated as a cycle where each step led to the next. Firstly, tutors found the materials, designed the lesson, and then had the OT and self-evaluation. Finally, they shared their strategies and difficulties and received feedback from others, which could become strategies for materials collection and problem-solving in the following lessons. Each step in this cyclic process is rich with learning and growth opportunities.

4.2 Analysis of tutors' perceptions of benefits when participating in the DLC

A qualitative method was conducted to gain deep insight into tutors' perceptions of benefits. The information from the interviews and reflective videos was regarded as representative of their opinions about benefits. The analysis of their response data revealed that the multi-functionality of JoinNet and the tutoring journal significantly facilitated OT, providing many advantages for tutors, including increased personal skills, social relationships, multicultural experience, social responsibility and self-discipline, altruism, self-efficacy, and affective values. Table 4 summarises tutors' perceptions of the benefits.

4.2.1 The multi-functionality of JoinNet and the tutoring journal

All tutors mentioned that JoinNet is an interactive whiteboard with many functions, such as drawing, a chatbox, etc., and has compatible functions. Examples are given as follows.

> The design of JoinNet is good. It can transmit visual and audio information and has a webcam to recognise students' feelings. When students are happy or sad, we can adjust our slides. (I5-2)
> JoinNet is an easy-to-use tool with compatible functions of Word, PowerPoint, painting, etc. (I2-2)

JoinNet was considered an effective tool to facilitate the OT process. For example, tutors could better adjust the lessons when they recognised the child's emotions through the screen, or use multimedia presentations to introduce the lessons.

In addition to JoinNet, a tutoring journal is a website for reflection such as content, activities, etc. Examples are provided below.

Table 4 A summary of tutors' perceptions of benefits when participating in the DLC

Themes observed	Description	Percentage
Multi-functionality of JoinNet and the tutoring journal	JoinNet with multi-functionality: chatting, writing, drawing, etc.	100%
	Tutoring journal: topic, methods, evaluation	100%
Personal skills		
Adaptive online tutoring skills	Adjusting the difficulty level and applying strategies to meet tutees' needs	93%
Language skills	Using English and Mandarin, looking up the dictionary for new words	93%
Designing skills	Integrating bilingual words with images, games, and worksheets	86%
Problem-solving skills	Adapting to the technology limitations, using different approaches to solve problems, and counselling	60%
Time-management skills	Adjusting content to fit the time	53%
Social relationships	Relationships: developing friendship	
	+Between tutor and tutee	100%
	+Between tutor and tutor	80%
	+Between tutor and supporter	47%
Multicultural experience	Culture exchange: understanding of	
	+Taiwanese culture	100%
	+Tutors' own culture	67%
	+Other tutors' cultures	47%
Altruism	Sharing empathy, love and care with others	87%
Social responsibility and self-discipline	Preparing tutoring materials, writing a tutoring journal, and committing oneself	100%
Self-efficacy and affective values	Feeling self-confident to talk	80%
	Feeling personal growth, perceiving progress and achievement of students, satisfaction, and appreciation	80%

The tutoring journal has some questions related to content, activities, and a 5-point Likert scale for evaluation. It helped me self-evaluate and check my student's progress through week-by-week assessments. (I8-1)

Writing a tutoring journal is a way of reflection. All tutors could reflect on themselves and adjust for the next lesson. They could track how well the children performed and progressed through each weekly session.

4.2.2 Improvement of personal skills

When joining DLC, tutors designed materials, applied different approaches and strategies, and adjusted them to help the tutees learn better. The experience in preparation and instruction sharpened their remarkable skills. Some examples are demonstrated as follows.

Although I had teaching experience before, I hadn't taught online. After some weeks, I designed materials better and adjusted strategies to meet my student's needs. I learned how to solve the problems, such as asking questions to make him focus on the lesson when he was inattentive. (I1-1)

My language skills, English and Mandarin, improved. Before tutoring, I practised and explained the new words in English. When designing slides, I looked up the dictionary for suitable Mandarin words. (I9-1)

To help the students understand the lessons better, I designed the slides with words and pictures and managed the content effectively based on the fixed time. (R3-1)

OT required tutors' massive investment from the pre-class preparation to the while-tutoring process. As a result, tutors attained the expected harvest of their skill development, including adaptive OT skills (93%), language skills (93%), designing skills (86%), problem-solving skills (60%), and even time-management skills (53%).

4.2.3 Development of social relationships and multicultural experience

In addition to personal skills, DLC connected tutors with tutees, other tutors, and supporters whose values differed from theirs, thus developing new social relationships and exploring cultures. Examples are listed below.

In the beginning, my student was shy to talk. After some discussions, she spoke more. When the topic was food, she introduced how to cook her favourite food. We were willing to share and experience many unforgettable memories from strangers to friends. (I11-2)

My student likes travelling and wants to know about other cultures. We shared the similarities and differences between Kenyan and Taiwanese cultures. Sometimes, I did not know my culture and needed to find the information to introduce to him. (I12-2)

When joining DLC, I knew more tutors and supporting members who were very kind to me. (R1-1).

This project allowed tutors to build social relationships with tutees (100%), other tutors (80%), and supporters (47%) and enhance their community connections. They could better understand their own culture (67%) and get exposed to multiple cultures (47%), improving their cultural comprehension and appreciating other countries' values. Moreover, by learning about Taiwanese cultures (100%), they could quickly adapt and have harmonious interactions with the Taiwanese tutees.

4.2.4 Increase in altruism

Remote tutees confronted many learning obstacles. Of the tutors, 87% felt sympathetic for the tutees and cared about their learning. Tutors endeavoured to make the lessons more exciting and adjusted the approaches to meet their needs. Examples are given as follows.

The remote kids have poor learning conditions compared to urban students, so I wanted to help them feel more confident and have a better learning opportunity. (R6-2)

My student likes animations, so I tried to use animations to motivate him to learn better whenever I taught him. (I15-1)

Tutors cared for the children's learning and wanted them to have a better learning environment. Their sympathy increasingly became a commitment to loving people and the community, leading to increasing altruism.

4.2.5 Development of social responsibility and self-discipline

When joining the DLC, all were required to prepare materials and write a journal every week, so this involvement helped them develop a sense of responsibility and commitment. Examples are provided below.

When tutoring my tutee, I learned to commit myself to being responsible for her study. I tried to be well-prepared for every session to help her understand the lesson well. (I3-2)

The reminder of lessons was sent to our email and Facebook group weekly, so I needed to be responsible for preparing materials and writing the journal. (R2-2)

Tutors became more self-disciplined and responsible for tutees' learning, so they tried to commit themselves to offering tutees interactive sessions.

4.2.6 Enhancement of self-efficacy and affective values

In the beginning, some tutors were still anxious because they had not got prior OT. Then they tried to interact with tutees, and 80% of tutors said they became more confident in delivering the lessons. OT represents a journey in which tutors step out of their comfort zone into a challenging situation for personal growth. Examples are given as follows.

I am an introvert, so I am reserved in communicating with others. Initially, I felt very nervous because I had not taught online before. When joining DLC, I knew more people and became more confident talking to them. (I11-2)

Besides self-efficacy, most tutors became happy when seeing their tutees' progress, making them feel more appreciated for their tutoring. Examples are listed as follows.

In the beginning, she could not understand many words because of her low English level. Then she had a notebook to note new words. She answered correctly when I checked, and told me I had tutored her before. I feel our effort is worthwhile, and I could stimulate her interest. (I3-2)

Joining the DLC enhanced tutors' self-efficacy, and they appreciated and valued seeing the children's progress in the weekly sessions.

4.3 Analysis of tutors' perceptions of challenges when participating in the DLC, solutions, and suggestions

The interviews and reflective videos revealed some challenges associated with technical problems, communication, tutee background, and tutoring duration. Additionally, the solutions and suggestions were identified for project development. Table 5 summarises tutors' perceptions of challenges, solutions, and suggestions.

4.3.1 Technical problems

Connection plays a crucial role in every OT because if there is no connection, there will not be OT. According to tutors,

Table 5 A summary of tutors' perceptions of challenges, solutions, and suggestions

Themes observed (challenges)	Description	Percentage	Themes observed (corresponding solutions/suggestions)	Percentage
Technical problems	Slow computer and unstable connection	100%	Upgrading the connection Providing the high-speed computers	100% 87%
Communication barrier	Language barrier: low Mandarin proficiency	93%	Integrating bilingual words with images or animations Using Google translate Sharing desktop	93% 86% 67%
Lack of detailed tutees' information	Unsuitable design of materials for tutees' levels	60%	Providing tutors with detailed tutee information: background, characteristics, personality, levels, learning needs, interest	60%
Insufficient tutoring duration	Short time to convey the lesson	47%	Extending the tutoring time	47%

connection instability sometimes occurred, and some computers were too slow to open, restricting the smooth OT process. Examples are given as follows.

> The computer is too slow and takes a long time to access. The transmission was not very good, and I could not connect with my student. Sometimes, I had to wait 1 hour to reconnect, which was time-consuming. The quality will improve if the school provides high-speed computers and upgrades the connection. (I14-2)
> The connection is so bad. Sometimes it automatically logged out, and I had to re-login. If there were any technical problems I could not solve, I would ask the supporter to help. I suggest tutors should check the connection to make the lesson more effective. (R9-1)

The connection was considered the most significant technical challenge. The low-speed connection prevented the smoothness of the tutoring process and frustrated tutors because they wasted time waiting to solve the problem. Tutors tried to reconnect and asked for supporters' help when necessary. All tutors suggested that supporters should check to ensure the high-speed connection, or the school should upgrade it and support them with better facilities to make OT more effective.

4.3.2 Communication barrier

The DLC tutors are international students with limited Mandarin skills, while the tutees' English proficiency is low. Of the tutors, 93% felt frustrated due to the communication barrier, especially the language barrier in the beginning. However, it broke down after some weeks. Examples are illustrated below.

> The biggest challenge is the language barrier. I could not speak Mandarin well, and my student could only speak a little English, so when he said specific Chinese terms, I did not understand. For example, when talking about animation, he knew Mandarin names,

and I knew English, so we did not understand each other. Then I used bilingual words with images when designing slides. Sometimes I used desktop sharing or Google translate to demonstrate the lesson. (I2-2)

The language barrier was challenging for tutors. To deal with it, they suggested that images integrated with bilingual words could help tutees understand the content more easily. Moreover, tutors could use Google translate (86%) or desktop sharing (67%) if they did not know how to explain the meaning.

4.3.3 Lack of detailed tutee information

Despite being informed of the school level, more than half of the tutors encountered difficulties designing slides for the first session due to insufficient detailed tutee information, such as levels and characteristics. Examples are reported below.

> I was informed about tutoring one junior high school student, so I designed the content appropriate for his level. However, his English proficiency was only beginner, so I found it challenging to tutor him in the first session. If the DLC team can inform me of his detailed information, I can prepare better slides. (I10-2)
> My student is shy to talk to others. When teaching her, I knew she was Aboriginal and had few chances to speak to foreigners. If I had known her information before, I could have prepared engaging lessons related to her culture to motivate her. (I4-1)

Lacking detailed information about tutees caused challenges in designing materials. Therefore, if the DLC tutors were informed of the tutees' backgrounds, it would be beneficial to design and perform better lessons to stimulate their interests.

4.3.4 Short tutoring duration

Regarding tutoring duration, there were 10 consecutive weeks, and one session lasted for two hours. Of the tutors, 47% reported that the duration was too short to convey all content to tutees. An example comment is listed below.

> The tutoring time was too short, and we could not communicate as we wanted. I think the project can increase the duration, and it will be better for communication between tutors and tutees. (I13-1)

The tutoring duration was short, restricting tutors from conveying their knowledge to the children. Thus, it is recommended that the tutoring duration can be extended to help tutors and tutees have sufficient time for interaction.

5 Discussion

5.1 Tutors' engagement in processes to produce the online tutoring sessions in DLC

The COVID-19 pandemic caused educational challenges, and especially, students lacked direct interaction with others due to social distancing. Participating in OT in the DLC connected international tutors with local children, and this current study showed a clear picture of the cyclic processes of OT in which tutors experienced five steps: collecting, organising and designing, tutoring, reflecting, and sharing during the pandemic. In the first two steps, tutors were involved in materials preparation, helping them construct knowledge and become active learners rather than passive knowledge recipients according to the constructivism theory [31]. In the third step, tutors learned how to use the different strategies, make suitable adjustments, and deal with problems, thus accumulating their experience and improving their skills.

In the two final phases, tutors wrote reflections and shared their experiences with other tutors and supporters. Tutors could self-assess through reflection, share problems and find solutions, which can increase the connectedness to others, develop the relationship and be a resource to construct and develop knowledge [56]. In addition, knowledge sharing and working collaboratively can facilitate their learning and solve the arising issues [57], leading to more effective results for individuals than working alone. Sharing knowledge with others from different backgrounds in the DLC constructs socially and culturally diverse knowledge, aligning with the social constructivism and sociocultural theory by Vygotsky [31].

5.2 Tutors' perceptions of benefits when participating in the DLC

The qualitative results indicated the benefits of OT. Regarding technology, JoinNet was a significant way for tutors to communicate with children during the COVID-19 pandemic. Specifically, communicating through the screen helped them get immediate feedback based on tutees' emotions to adjust the lessons, and the compatibility in JoinNet supports multimedia presentations. These results agree with Chambers et al. [58], who argued that using technology can enhance tutoring effectiveness by providing children with multimedia presentations, assessments, and interaction with their tutors. Moreover, post-session reflective journals helped tutors reflect on themselves and evaluate the lessons and students' progress for better adjustments, which could be an effective way to accumulate knowledge, as mentioned by Nonaka and Konno [59].

In addition to technological benefits, OT provided experiential learning opportunities to improve tutors' skills, social relationships, and multicultural experience during the COVID-19 pandemic, which echoed the existing literature [8, 9, 11, 21, 45]. It can be explained that when joining the DLC, tutors learned what to focus on, how to design materials, and identify and solve problems, thus developing their necessary skills. Moreover, communicating with tutees, tutors, and supporters from different cultures increased their social relationships and multicultural experience.

Among the most important findings was the development of altruism, social responsibility, and self-discipline. These findings are consonant with previous studies [10, 11, 60], implying that SL offers participants many contexts to develop altruism and increase social responsibility and social concern. Moreover, tutors enhanced their self-efficacy, satisfaction, and a sense of achievement and appreciation when tutees made progress, which aligns with ChanLin et al. [7].

5.3 Tutors' perceptions of challenges, solutions, and suggestions

When participating in the DLC, tutors encountered some challenges regarding technical problems, communication barrier, etc. The challenge most reported by tutors is technical issues; notably, the poor connection restricted smooth communication with tutees. The same result was found in Shraim and Khlaif [61], and Al-Ansi et al. [62], who reported that the digital divide, low speed and bandwidth of the Internet, and technical limitations are challenging to e-learning implementation. Therefore, it is suggested that the Internet connection should be improved.

Another challenge facing tutors is the communication barrier. During the pandemic, communication took place through online videoconferencing. All DLC tutors were international students with low Chinese proficiency, while tutees had limited English ability, leading to the language barrier. This result was consistent with Farid et al. [63], who posited that the language barrier is challenging for e-learning implementation. To solve this problem, tutors should use bilingual words and demonstration images when designing materials to help students easily follow the lesson. The application of visual arts could stimulate students to express their thoughts and feelings, and enhance their reading ability, cognition, and motivation [64].

Concerning tutees' backgrounds, tutors encountered difficulties designing materials without knowing their detailed information, such as characteristics and background. Student background is vital to explain how much students learn and progress [65]. Therefore, tutors should be informed of the detailed information to design better lessons and motivate their learning. Referring to duration, some tutors mentioned that two hours was not sufficient to convey their ideas. The exposure time to SL appears to lend a vital impact on student results [66], such as 50 or 30 h could be sufficient to produce positive results. There should be a tutoring time extension to provide tutors and tutees with sufficient interaction time. If these problems can be solved, it can enhance tutoring quality and bring more potential benefits.

6 Conclusion, implications, and limitations

This study covered how tutors conducted the OT and their perceptions of the benefits and challenges of OT during the COVID-19 pandemic. Regarding benefits, tutors claimed that using JoinNet and the tutoring journal greatly facilitated their OT process. As a result, they improved their personal skills, social relationships, multicultural experience, altruism, social responsibility and self-discipline, self-efficacy, and affective values. However, tutors faced some challenges, such as slow Internet connection, communication barrier and gave some solutions and insightful suggestions for the project development.

6.1 Practical implications

The findings of this study have some practical implications. Firstly, gathering information about tutors' perceived benefits can provide a holistic picture of OT implementation during the COVID-19 pandemic. These findings also support the promising values of SL for the development of the community, students, and institutions, which positively impact the faculty or school culture; even in the post-COVID-19 era, the effects could remain. The administrators can change their prejudices, accept incorporating similar online SL programs into their curricula, and have suitable adjustments such as reshaping or restructuring the learning culture. Secondly, the challenges were identified, and solutions and suggestions from this study could be offered to improve future projects. Therefore, when designing or conducting similar SL projects, the instructional designers or administrators should anticipate the challenges impeding successful implementation, leverage these solutions or useful suggestions to limit them, and formulate holistic educational strategies to implement OT successfully. Lastly, the insights generated from this current study can be used as the background to conduct further related studies, which is an addition to the existing literature to bridge the gap.

6.2 Limitations and recommendations for further study

The current study relied on the international tutors' perceptions of DLC during the pandemic, so it cannot completely reflect the diversity of all international tutors in Taiwan. Due to the pandemic restrictions, the study used a small sample size; the findings cannot be generalised to all international students in Taiwan. Therefore, future studies should involve more tutors with different disciplines at many universities to draw a more representative result. Furthermore, the study lacked the comparison of cultural differences, although there was a diversity of participating international tutors; thus, ongoing studies can look into tutors' intercultural competence or multicultural experience when implementing an online SL project with the participation of international students.

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Declarations

Conflict of interest There is no potential conflict of interest in this study.

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