

# Researching teacher professional learning in a virtual environment: An online study model

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Interest in researching teacher professional learning in online environments has grown notably in the last few years. To advance the understanding of the process of teachers learning in online settings, we designed an online Learning study that draws on Mind, Brain, Education Science to examine the development of teaching practices, beliefs, and knowledge about brain-based principles of eight Japanese university teachers teaching English as a foreign language. Learning study, as a professional learning approach, promotes teacher collaborating to conduct their own classroom research that is framed using an explicit theoretical framework; the learning study concomitantly provides an appropriate context to research teacher professional learning. Specifically, the model we designed included both asynchronous (questionnaires, online module content, notebooks) and synchronous learning opportunities (interviews, focus groups, observations/video-recordings of own teaching) to explore the teachers' engagement with and application of brain-based principles in their classrooms. At the center of the online learning study model were five modules with each module consisting of a 3-week cycle for the teachers to learn about: (1) the brain, (2) emotions/stress, (3) language, (4) memory, and (5) embodiment. The aim of this paper is to first present a detailed overview of our ongoing study, and then present the participating teachers' perceptions of the strengths and limitations of the model.

## 1. Introduction

Teacher professional learning (TPL), encompassing how teachers engage in their own learning as practitioners and what means could be used to facilitate this learning, has generated considerable discussion in English language teaching. Interest in TPL in online environments, particularly the use of technology to support second language (L2) teachers (e.g., McCarthy, 2021; Pasternak, 2021), has grown substantially in the last few years. TPL studies often integrate online support to investigate the structure and nature of these teachers' learning communities (e.g., Kabilan et al., 2011) or the effects that novel points of contact (e.g., connecting teachers via Twitter, WhatsApp, or Facebook) have on TPL (Kiss, 2020; Motteram et al., 2020; Slogoski, 2019). Having noticed a potential imbalance in research focus between the modes of TPL and content being learned, we designed a research project to explore the development of university English teachers' practices and cognitions (i.e.,

beliefs, knowledge) in an online setting. This ongoing project focuses on enabling L2 teachers to learn collaboratively in virtual settings about principles of Mind, Brain, and Education Science, an emergent field of study that provides a crucially needed intersection between neuroscience, psychology, and education (Tokuhama-Espinosa, 2018). The project, conducted with teachers from a university English program in Japan, encapsulates a modified version of a Learning study (a teacher professional learning approach) that has been successfully used in face-to-face mainstream education by researchers to examine teachers' collaborative uptake and application of educational theory in the classroom (e.g., Tan & Amiel, 2022; Tan et al., 2019).

The aims of the current paper are twofold: (1) to provide a detailed account of our online learning study (OLS) model, and (2) to report on participating teachers' perceptions of the OLS. Thus, the paper makes an important contribution by shedding light on an innovative way of researching and facilitating TPL in a virtual environment, possibly affording other researchers and educators' insights into emulating this model of teacher professional learning within their research contexts.

## **2. Researching teacher professional learning in online settings**

Recent books and articles discussing research on L2 TPL have revealed insights into the methods of delivering professional learning programs, with implications for effectively supporting teacher learning (e.g., Crandall & Christison, 2016; Ha & Murray, 2021; Woodward et al., 2018). For example, teacher-centred and job-embedded approaches that facilitate the complex and individualized development of L2 teachers' professional trajectories, including their practices and cognitions, have been suggested to allow teachers to apply newly learned content in their classrooms. This is viewed to be more effective than top-down mandated approaches, such as conference or workshop attendance (Hayes, 2019; Nguyen & Newton, 2021), which have faced criticism for their one-off formats (Elmore, 2002).

Research on TPL conducted in virtual settings has provided interesting methodological insights into flexibly supporting teacher learning. Walsh et al. (2013), for example, used mobile phones to explore the possibility of supporting the professional learning of teachers in Bangladesh. Similarly, Motteram et al.'s (2020) work suggested that the use of WhatsApp can facilitate TPL in a Jordanian refugee camp, while Kiss (2020) used Facebook to enable communication among early-career Singaporean teachers regarding their experiences and social identity formation. More to the purposes of our paper, Chen and Huang's (2022) study utilised a Moodle platform, in combination with WeChat, to provide an online listening and speaking training program for English teachers in Chinese primary schools; interviews with the participating teachers showed the program was perceived positively. These studies have provided valuable methodological insights into online TPL; yet, more detailed accounts of models specifically designed for promoting and researching TPL in online settings are required for researchers to emulate this line of inquiry, and, ultimately, for the field to better understand L2 teachers' TPL process occurring in virtual environments.

The OLS model we designed included both asynchronous and synchronous features that supported our exploration of teachers' engagement with and application of brain-based principles in their classrooms. Preliminary findings of this ongoing research project are promising in that they showed the teachers' developing practices and cognitions over the course of the project (Burri et al., 2023). However, that paper was principally concerned with the initial impact of the OLS on participating teachers' self-report practices and cognitions about brain-based principles. A closer investigation of teachers' perceptions regarding the actual OLS model is needed when evaluating whether this is indeed a useful means to foster and research TPL. Before the teachers' perceptions are discussed, we first present a comprehensive overview of our OLS with the goal of establishing the transferability for fellow researchers seeking to emulate and adapt this model.

### 3. Learning study

Learning study is a theoretically grounded, collaborative inquiry approach that has been employed widely to promote student learning via teacher professional development (Pang & Runesson, 2019). Often regarded as a variant of collaborative action research, learning study draws from key features of the Japanese Lesson study (Murata, 2011) as well as design experiment (Brown, 1992; Collins, 1992) to emphasize the importance of collaboration and practice-oriented, classroom-based research for teacher learning (Pang & Ling, 2012; Pang & Runesson, 2019). A distinguishing feature of the Learning study approach pertains to its emphasis on educational theories and perspectives, where teachers' drawing upon theoretical perspectives to reflect, test, and theorize about their own pedagogy (Elliott, 2015) is deemed as an essential part of the teaching profession.

Within a Learning study, teachers are provided opportunities to systematically and collaboratively design, enact, and review their own theory-framed lessons (Lo, 2012; Holmqvist, 2011). As such, teachers learn about, apply, and reflect on new theoretical perspectives via implementation of their classroom research. With student learning as the point of departure, the goal of Learning study typically revolves around increasing teacher knowledge, improving teaching practice, and/or promoting student learning (Pang & Ling, 2012; Wood & Sithamparam, 2015). Studies have also shown how teachers develop greater coherence between theory, pedagogical decision making, and student learning (Kullberg et al., 2017; Tan et al., 2019). To these ends, the approach has been successfully employed in research projects investigating mainstream educators' engagement with and understanding of neuroscience theories (e.g., Tan & Amiel, 2022; Tan et al., 2019). All Learning studies with a focus on neuroscientific principles to date have been carried out in face-to-face settings and generally featured the following stages (Tan & Amiel, 2022):

- Theory exploration meetings for the facilitator to introduce and discuss neuroscientific theories and concepts with the participating teachers;
- Lesson design meetings for teachers to collaborate on creating lesson plans that incorporate newly gained knowledge and neuroscience principles;
- Classroom observations in which teachers observe how students are learning via the collaboratively designed lessons;
- Post-lesson conferences for teachers to reflect on their teaching practices and lesson plans; and,
- Sharing of newly gained insights and understandings in a professional development workshop that participating teachers have the opportunities to co-facilitate.

To advance our understanding of online TPL, we adapted Tan and Amiel's (2022) model (see also Tan et al., 2019) and designed an OLS study that would allow us to research TPL in a virtual environment. A few years prior to the project, the director of a university English program in Japan and the lead author met in Tokyo to discuss the possibility of conducting research with their English language teachers. Being involved in research was expected of the program's teachers, and thus presented an excellent opportunity to explore a new avenue for TPL. The university program employs a total of 25 English teachers (10 full-time and 15 part-time), and their undergraduate students are enrolled in various majors, of which English is a mandatory subject for first- and second-year students.

### 4. Online Learning study model structure and participants

As shown in Table 1, two months prior to the commencement of the research project, the lead author met via Zoom with English language teachers from the participating Japanese university's English program. This introductory session gave the teachers an overview of the project and its purpose, with time for teachers to ask questions. Following this session, eight teachers – that were

informed about the study – gave written consent. The eight participating teachers were divided into two groups based on employment status: Full-time (FT; n=4) and Part-time (PT; n=4). Practical considerations mainly drove this division amongst the participants, as the PT teachers held various English teaching jobs in the region and were thus teaching in the English program on different weekdays. Grouping the participants as either FT or PT ensured all participants were able to attend the focus group meetings during the 15-week OLS. The teachers' ages ranged from early thirties to late fifties, and all of them were experienced, with their years of English teaching experience ranging from five to more than 20 years. To maintain confidentiality, the teachers' names were de-identified and labelled T1-T8.

As for the teachers' backgrounds, T1-T7 all had at least a master's degree in TESOL or related fields (T3 and T5 had a doctorate), while T8 was in the process of completing her graduate degree. T3 was the director of the program and T4 was overseeing the part-time teachers, yet both of them were also teaching English classes. T2 was on maternity leave and was therefore not in the classroom but expressed strong interest in learning about the brain and a desire to take part in the OLS.

Table 1. Overview of online Learning study model.

<b>Zoom Information Session (February 2022)</b>	
Pre-program Online Questionnaire and Pre-program Zoom Interview (March 2022)	
Completion of Modules 1-5 in 15 weeks with each module consisting of a 3-week cycle (April – July 2022):	
First Week: Introduction of new brain-based principle (weeks 1, 4, 7, 10, and 13)	Participants work through module content (on their own)
Second Week: Teacher collaboration and planning (weeks 2, 5, 8, 11, and 14)	Zoom focus group: Participants collaboratively identify and incorporate brain-based principle(s) into existing materials and/or lessons
Third Week: Implementation of brain-based principles (weeks 3, 6, 9, 12, and 15)	Participants observe a lesson taught by another study participant or video record their own teaching; enact & reflect (during the Zoom focus group session in the 2 <sup>nd</sup> week of the next 3-week cycle) on how principle(s) influenced their teaching and student learning
Post-program Online Questionnaire & Immediate Post-program Zoom Interview (July/August 2022)	
Delayed Post-program Zoom Interview (December 2022)	
Planned Classroom Observations & Face-to-Face Interviews (July – December 2023)	

Two weeks before the 15-week OLS began, the lead author interviewed each participating teacher for about 30 minutes. The purpose of these semi-structured pre-program interviews was to get to know the teachers and to gain insights into their educational and teaching experiences/backgrounds, and general beliefs about the brain, brain-based teaching/learning, and English language teaching. The interviews were carried out, recorded, and initially transcribed verbatim via Zoom. Following the pre-program interviews, the teachers completed a pre-program questionnaire (hereafter Q1) administered through Qualtrics. Q1 aimed to capture the teachers' initial beliefs and understandings of brain-based principles. To achieve this, Betts et al.'s (2019) survey was adapted, as their survey was utilized in researching various higher education stakeholders' perceptions about the brain. Revisions were needed to align the questions with the content included in our OLS (see the five modules below). Q1 featured 15 multiple-choice and short-answer items on the teachers' backgrounds, and 36 statements about the brain requiring either

'correct', 'incorrect' or 'I don't know' responses. The 36 items were presented both in English and Japanese to promote comprehension of the statements, as some featured more technical terms about the brain.

The face-to-face learning studies conducted in mainstream education typically frontload content and present new theories and constructs to teachers in several initial meetings (e.g., Tan & Amiel, 2022; Tan et al., 2019). However, attempting to accommodate the online nature of our 15-week online learning study, we modified this structure and created five modules with each module consisting of a 3-week cycle (see Table 1). For the teachers to learn about and engage with brain-based principles relevant to English language teaching, the five modules featured the following topics:

- (1) The brain, including its anatomy
- (2) Emotion and stress in teaching and learning
- (3) Language and the brain
- (4) Memory, including storage and retrieval
- (5) Embodiment: the mind-brain-body connection

We chose Weebly, a free website builder, to design these modules and to deliver our OLS content. The website also allowed us to deliver the content in multimodal form (e.g., written texts, YouTube videos, clips and transcripts of conference presentations, links to external resources, and Google Docs and Padlets), creating a potentially rich learning environment (for further reading on multimodal learning, see Diamantopoulou & Ørevik, 2022) for the teachers to learn about the brain and apply this newly gained knowledge in their classrooms.

Each module comprised the same three-week cycle and included synchronous and asynchronous learning opportunities. In the first week, the teachers worked through module content, available on the Weebly site, at their own pace and time. In the second week, the teachers joined the lead author in a 30-minute focus group (FG) session on Zoom. These sessions allowed for discussion of the module content, questions teachers might have had, and reflection on previous teaching experiences. The teachers also collaboratively identified brain-based principles they wanted to try implementing in their own teaching practices the following week. In the third week of the cycle, the teachers implemented these principles and either observed a colleague, or video-recorded themselves teaching a lesson. The method of observation depended on teaching schedules and availability. Along with giving teachers the opportunity to apply their learning, the third week allowed teachers to reflect on these principles, particularly in forming connections with their teaching and their students' L2 learning. Once a three-week cycle was complete, a new module was opened on the Weebly site and the next cycle recommenced. Teachers were also provided with notebooks – in Word format – that they could download for use in each module.

With the busy schedules of the participating teachers in mind, we designed the 15-week OLS (i.e., the five modules) in a way that required the teachers to spend no more than 1-2 hours per week engaging in the project. As such, we attempted to integrate the OLS into the teachers' existing workloads as much as possible, but we do acknowledge that this additional commitment might have affected some of the teachers' experiences and perhaps limited their uptake and application of module content.

Following the end of the five cycles, the teachers completed an immediate post-program questionnaire (hereafter Q2) in Qualtrics. Q2 included the same 36 statements about the brain, plus five open-ended questions to elicit the teachers' experiences in the OLS. The week after the teachers completed Q2, the lead author met with each teacher individually on Zoom for a semi-structured, 25-30 minutes immediate post-program interview (IPPI). This interview focused on the teachers' overall experience in the 15-week OLS, their thoughts on the Weebly site and content delivery, and any memorable moments (Richards & Farrell, 2005) that might have occurred during the 15 weeks. The teachers also discussed brain-based principles they found particularly interesting, relevant or irrelevant, and challenging or unclear. As with all the other online sessions, interviews were recorded and initially transcribed verbatim in Zoom.

This research project is still ongoing, with the lead author recently completing the delayed post-program interviews. Analysis of these interviews may reveal the extent of the teachers' long-term classroom application of their learning from the OLS. In addition to the recently completed interviews, we are also planning for the lead author to observe the teachers and interview them in person in the second half of 2023 (see Table 1). Given that teachers' practices and cognitions often begin to taper off after completing a professional program (Burri & Baker, 2020), examining the teachers' cognitions a full year after the conclusion of the 15-week OLS, as well as the long-term application of brain-based principles, will inform future iterations of our OLS model.

Triangulating multiple data sources (Creswell, 2013) afforded an in-depth understanding of the participating teachers' TPL process in a virtual learning environment, but their views of the model warrant exploration in order to better understand the effectiveness of the OLS. The following section provides a discussion of the teachers' perceptions of the OLS model's strengths and limitations.

## 5. Participants' perceptions of online learning study model

The FG meetings and the IPPIs were opportunities for the participants to discuss and reflect on their experience of taking part in the 15-week OLS. Thus, the lead and second author independently and inductively coded these data sources in NVivo12 to identify the participants' perceptions of the strengths and limitations of the OLS model. After completing the coding, the two of them discussed and refined the identified themes. This process was deemed to be sufficient, as the purpose of the coding was to obtain insights into the eight participants' perceptions of the OLS model. The themes and analysis were subsequently scrutinized by team members (Stake, 1995) during the preparation of this manuscript. In the subsections that follow, the teachers' perceived strengths and limitations of the OLS model are presented.

### 5.1 Perceived strengths

The analysis of the FG and IPPI data revealed that T1-T7 reported a regularly occurring TPL process that was intertwined with learning about brain-based principles, linking theory and research with practice, and reaffirming that their classroom practices and beliefs were theoretically and pedagogically sound. The data contained numerous examples of this interconnected process. At the beginning of the project, T4, for instance, mentioned that the brain-based content introduced through the OLS was interesting and familiar: "I found the content very interesting. I feel like I'm learning ... it was a good feeling starting to learn new things. Some of it was common sense, of course ... but, it's something that needs to be pointed out" (FGM1).<sup>1</sup> Three weeks later, T4 began to connect the theory with his teaching practice, which, in turn, confirmed his classroom practices: "There's actually kind of theory behind, you know, like backing up, what we actually do ... This is the reason why we do this in the classrooms, which is kind of interesting." Similarly, learning about brain-based principles helped support T6's pedagogical practices, "I found a lot of content that probably reinforced or helped to explain or helped to give me a basis on what I've already done" (FGM1).

After completing the OLS modules, T6 thought that "Consciously, [the OLS] reaffirmed most of my ideas" (IPPI). Furthermore, when discussing stress and emotions covered in the second module, T7 thought "It was interesting seeing something that you had felt confirmed ... Like, here's something I could have told you, as a teacher, like this is true. Now, having the actual physical evidence to back it up is kind of nice" (FGM2). At the end of the program, he reiterated that "It felt

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<sup>1</sup> FGM1 = Focus Group Module 1; FGM2 = Focus Group Module 2; FGM3 = Focus Group Module 3.

good to see that I was kind of on track with a lot of stuff. That the new information I was learning from some of the study materials lined up with my personal teaching philosophy and the education I had” (IPPI). He also felt that “the biggest benefit of the whole study was that it gave me some insights into my own teaching practice, and more than that, gave me a lot of areas of interest to focus on with my own research and future” (IPPI).

Overall, the comments above suggest the teachers felt their engagement in the 15-week OLS augmented their TPL. The teachers valued the learning of brain-based principles as they supported their teaching practice and perspectives of teaching and learning, and concomitantly served as a catalyst for teachers to engage in their own professional learning and research. Our OLS modules included new and interesting (brain-based) content that enabled participating teachers to connect theory/research with practices, reaffirming their practices, and on a regular basis reminding them of why they do certain things in their classrooms. However, the teachers also noted the model’s limitations, to which we turn our attention now.

## 5.2. Perceived limitations

The FG and IPPI meetings afforded the participants opportunities to provide feedback on the OLS’s limitations. The qualitative analysis of these sessions revealed two themes, mainly related to the limitations arising from the (1) structure, and (2) content of the OLS.

The perceived structural limitations of our OLS targeted the design and delivery of the Learning study cycles. T5 suggested dividing the first module’s content into two modules, as he thought that some of its content “...was a bit too dense” (IPPI). Additionally, as T1’s comment shows, the two-week period between the implementation of brain-based principles in the classroom and the FG meeting in a subsequent module might have been too long, making recall of classroom implementation, as well as content presented in previous modules, somewhat challenging for the teachers: “What did I do? Well, [T4] came to my class. So I think he knows better than me. I don’t remember actually. That was like two weeks ago, wasn’t it?” (FGM3). In that sense, an OLS may be more effective if its structure resembled the traditional face-to-face Learning study model (see Tan & Amiel, 2022; Tan et al., 2019) in which content is front loaded instead of being presented in a 3-week cycle. This would allow teachers sufficient time to work through, for example, the first three modules, typically focused on fundamental knowledge, together with a Zoom drop-in session at the beginning of each module. Such a structure would likely provide teachers with timely opportunities to reflect on, discuss, grapple with, and reinforce new module content. After completing these first three modules, the teachers could spend two weeks collaborating and planning the inclusion of brain-based principles in two separate lessons. Teachers could then teach and observe (or self-record) the two lessons, before following the same procedure in modules 4 and 5. This slightly different structure might allow teachers to engage with, process, discuss, and apply newly presented OLS content more effectively.

Also related to perceived structural limitations, the third week in the OLS cycle presented significant observational and reflection challenges for the teachers. Both the FT and PT groups found observations challenging, albeit in different directions. Initially, the FT teachers found it difficult to find time to observe each other. Hence, during the second module focus group meeting, it was agreed to limit the observations to parts of a lesson in which specific brain-based principles were applied. The PT teachers, on the other hand, struggled to set up the recording of their own lessons. The program director (T3) then provided technical support after the first module, but, as T5 pointed out, “It wasn’t ideal” because “The program’s not set up for that” (IPPI). These challenges may be explored further in the delayed post-program interviews, but the difficulties with self-recording their lessons may have impacted the PT teachers’ TPL process, or at least their perceptions of the OLS model. In light of the observation issues, researchers interested in conducting an OLS will need to carefully consider the challenges impacting peer or self-recorded observations.

The second theme regarding our OLS' limitations centred on the content included in the Learning study. Three PT teachers, for instance, suggested the need to more closely align practicality concerns with the theory presented in the five modules. T7's comment during the IPPI is reflective of the PTs' perspective: "I did get a little frustrated towards the beginning ... I had been hoping to get more practical tips out of it rather than more than just theory." T7 also suggested the use of more specific reflection questions to support teachers when connecting the content presented with classroom application. T5, on the other hand, proposed the inclusion of a short video at the beginning of each module to guide teachers regarding a module's main points and objectives, and he would have liked to have an occasional quiz to check understanding of the OLS content. Also related to content, three teachers' (T1, T2, and T6) noted difficulties with new brain-specific terminology at the OLS's outset. In the IPPI, T6 made the useful suggestion of embedding hyperlinks in the module content, linking key terminology to the provided glossary. Taken together, we interpret the teachers' comments regarding the aforementioned limitations to signal their desire for greater clarity on how the brain-based principles might be applied to classroom teaching, as well as greater opportunity to become familiar with brain-based terminologies and principles. These points of consideration will be incorporated in our future iterations of the OLS.

In addition to perceived limitations of the OLS's structure and content, data from T8's contributions offered an alternative perspective regarding the OLS model. From the onset of the OLS, she pointed out that "This was a review for me because I studied psychology in my undergrad" (FGM1). The following statement reflects her perspective which remained unchanged during the project: "So it wasn't really anything new to me. So it just looked like I was just attending a lecture" (IPPI). She also thought that "There was no objective in the beginning; so it was a little confusing" (IPPI) and she appeared to be unsure about the overall purpose of the OLS. It must be noted, however, that T8 missed the initial orientation session (see Table 1) and joined the research project just a few days prior to its commencement; thus, the focus of the OLS on the application of the brain-based principles to teaching, as opposed to merely learning about these principles, might have resulted in T8 having different expectations of the study. Moreover, T8 began teaching in the university program as the OLS commenced, while, at the same time, she was also completing her graduate studies. Having these other commitments might have prevented her from fully engaging in the OLS. In our view, T8's perception supports the notion that TPL is a process that is often unique to an individual teacher (Burri & Baker, 2021). Yet, her view stood in contrast to the other seven teachers who, in spite of sharing the limitations of the OLS model, were generally positive about taking part in the OLS. Nevertheless, T8's perspective has provided valuable insights for us to deliberate upon how we might improve the OLS in terms of managing teachers' expectations, aligning with their goals for participation in the study, as well as to ensure they feel supported throughout the study.

## 6. Conclusion

The aims of this paper were to present an innovative OLS model designed to research and facilitate TPL, and to discuss the teacher participants' perceptions of this model. The majority of teachers felt positive about the OLS model; however, further data collection and analysis may enable a more nuanced understanding of the teachers' developing practices and cognitions about brain-based principles. The eight teachers taking part in our OLS were experienced L2 practitioners that were able to connect theory and research with practice, but whether this also holds true for other L2 teachers (e.g., novice teachers) warrants future research. Nonetheless, we believe our OLS model holds great promise as a professional learning approach to facilitate TPL in a virtual environment and concomitantly conduct research. This is echoed in T4's comment that "the [OLS] has influenced [their university] program already in a way" (IPPI).



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