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Teacher Professional Learning: Using an Online Learning Study Model to Facilitate EFL Teachers' Self-reported Practices and Cognitions about Brain-based Principles

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Introduction

Professional learning for in-service second language (L2) teachers is a growing research area (Woodward et al., 2018). Specifically, the process of L2 teachers' professional learning (TPL) of how they engage in their own learning as practicing professionals. This is particularly important considering that the growth of teachers' practical knowledge may plateau, leaving teachers feeling isolated after completing their teacher education programs in the absence of institutional support (Webster, 2019). Additionally, Burri and Baker's (2021) longitudinal study on learning to teach English pronunciation provides evidence of the gradual and complex nature of L2 teachers' professional learning. Their research demonstrates the strong influence that contextual factors (e.g., time, curricular constraints, and program requirements) often exert on the development of teachers' cognitions (i.e., beliefs and knowledge) and practices. Recent studies have suggested that job-embedded learning and collaborative workshops can positively impact teachers' cognitions and pedagogical skills (Ha & Murray, 2021; Nguyen & Newton, 2021); however, most of this research has been delivered through face-to-face modes.

Recent work on TPL in online environments has generally focused on the integration and utility of technology in the L2 classroom and teacher education (see, for example, McCarthy, 2021; Pasternak, 2021). Relevant to the present study, Chen and Huang (2022) used a Moodle platform to conduct a 12-month listening and speaking training program for in-service English as a foreign language (EFL) teachers



working in Chinese primary schools. The findings showed that teacher-participants “enjoyed [the program’s] flexibility in terms of scheduling, diversified contents and the variety of oral English activities” (p.180), but to what extent the online program shaped the teachers’ professional learning is not clear.

One model that offers insights into the connection between TPL and learning programs is the learning study approach. In a learning study, instructors collaboratively explore new theoretical knowledge and then apply this learning to frame students’ learning experiences and their teaching practice (Amiel & Tan, 2019). Building a collaborative learning community enables teacher-participants to learn together and share insights and challenges they encounter while applying their newly gained knowledge to instructional practices. How such a model might be designed to support L2 teachers’ TPL in online environments has yet to be explored.

As emergent research explores the benefits of online TPL, new and relevant TPL models for L2 teachers are being called for as a response to the rising concerns about the ineffectiveness of traditional, top-down approaches (e.g., professional development days provided or mandated by institutions; Anderson, 2018; Borg, 2015; Hayes, 2019). This brief report can be seen as a response to this call, in which we set out to design an online TPL program for in-service EFL university teachers in Japan. Our project aimed to create an online community of inquiry (Garrison et al., 2000) to advance an understanding of TPL in an online environment facilitating the development of in-service EFL teachers’ professional learning. The goals of this paper are to: (1) report on the preliminary findings of an ongoing research project and (2) to evaluate the impact of the 15-week online learning study program in facilitating the development of EFL teachers’ practices and cognitions about brain-based principles.

Online Learning Study

According to Tan and Nashon’s (2013) model, a learning study typically consists of three iterative parts: (1) the facilitator and the participating teachers discuss new theoretical concepts in 4-5 weekly 1-hour sessions; (2) the teachers work in pairs or groups to create lesson plans reflecting the newly learned content; and (3) the participants teach their planned lessons, observe each other, and reflect on their pedagogies in relation to the new concepts included in the lessons.

The online learning study we designed was underpinned by prior Mind, Brain, and Education Science (MBES) research (Amiel & Tan, 2019) for EFL teachers to learn about, engage, and experiment with five brain-based principles over 15 weeks: (1) an overview of the brain and its anatomy, (2) the roles of emotions and stress in teaching and learning, (3) language processing in the brain, (4) memory storage and retrieval, and (5) the mind-brain-body connection (i.e., embodiment). Research in mainstream education has shown that teachers’ knowledge of MBES significantly improved pedagogy and student learning (Amiel & Tan, 2019). MBES is a relatively new academic discipline where education, psychology, and neuroscience are brought together to provide important knowledge about the brain and its connection to education that teachers can use to enhance classroom teaching and learning (Tokuhama-Espinosa, 2018). An online learning study that focuses on MBES appears to be a powerful means of TPL with the potential for significant advances to teachers’ cognitions and practices.

This project represents an important line of inquiry intending to help teachers align their pedagogies with the latest findings from MBES research. Such an alignment has great potential for improving instructional practices and student learning. The following overarching research question guided the research project: *How does an online learning study support EFL teachers’ developing practices and cognitions about brain-based principles in the classroom?*

Methodology

Context and Participants

The 15-week online learning study was conducted in an undergraduate English program at a Japanese university. The program has ten full-time (FT) teachers, and 15 part-time (PT) teachers who work at multiple institutions, while the students – majoring in Regional Design, International Studies, Education, Engineering, or Agriculture – are required to take English in their first and second year of study. This university’s program director had previously expressed interest in being part of a research project to the first author, seeking opportunities for her teachers’ professional learning.

Two months before commencing the learning study, the first author held a general information session on Zoom with teachers working in the university’s English program. Teachers at the research site were presented with an overview of the project and given an opportunity to ask questions. Following the session, volunteering teachers provided written consent and were grouped according to their full-time (n=4) or part-time (n=4) employment status to ensure their focus group attendance (see description below). To maintain confidentiality, the teachers were labelled T1-T8. None of the participants had previous experience with MBES, although T8 had an undergraduate degree in psychology and molecular biology. In addition to teaching duties, T3 directed the program and T4 coordinated PT teachers, whereas T2 was on maternity leave and therefore not teaching. Table 1 provides an overview of the participants’ backgrounds.

TABLE 1
Participants’ Backgrounds

Teachers	Nationality	Age; Gender	Education	Teaching Experience (Years)	Teaching in Current Program (Years)
Full-time Group					
T1	Japanese	25-34; M	Master’s in TESOL	5-9	1-4
T2	Japanese	35-44; F	Master’s in TESOL	5-9	1-5
T3	Japanese	55-64; F	PhD in Education	20+	1-4
T4	New Zealand	45-54; M	Master’s in Applied Linguistics	20+	10-19
Part-time Group					
T5	Australia	45-54; M	PhD in Applied Linguistics	20+	5-9
T6	England	35-44; M	Master’s in Multimedia Fine Art	10-19	10-19
T7	USA	45-54; M	Master’s in Applied Linguistics	20+	1-4
T8	USA	35-44; F	Bachelor Degree in Psychology/Molecular Biology; currently working on her Master’s in TESOL	5-9	Less than 1

Online Learning Study and Data Collection

The online learning study project was qualitative in nature, but contained minor quantitative survey elements (see Appendices A and B), and stretched over ten months (as shown in Table 2). At the beginning of the project, the first author interviewed the participants to obtain information about their backgrounds, teaching experiences, beliefs, and general knowledge about the brain. A week later, the participants completed an online pre-program questionnaire (Q1) that was presented to them via Qualtrics. Our questionnaire was modelled after Betts et al.’s (2019) survey. Their survey, available online, was developed

for use with instructors, instructional designers, and administrators in higher education, exploring their knowledge and understanding of the brain. To align with the content of our TPL program, we modified Betts' survey to include only those items that were covered in our online learning study's five modules. Q1 thus consisted of 15 demographic items and 36 statements about the brain (e.g., *We use our brain 24 hours a day*) in which participants could select "correct," "incorrect" or "I don't know," taking an average of 15 minutes to complete (see Appendix A for the 36 statements).

TABLE 2

Online Learning Study Structure

Pre-program Online Questionnaire (Q1) and Pre-program Zoom Interview		
Completion of five modules in 15 weeks with each module consisting of a 3-week cycle:		
First Week: Introduction of new brain-based principle (weeks 1, 4, 7, 10, and 13)	Modules 1-5	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 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 nd week of the next 3-week cycle) on how principle(s) influenced their teaching and student learning
Post-program Online Questionnaire (Q2) & Immediate Post-program Zoom Interview		
Delayed Post-program Zoom Interview		

During the 15-week online learning study, the teachers learned about and engaged with five brain-based principles presented in five Modules (see introduction). Drawing on a wide range of MBES experts, psychologists, and neuroscientists (e.g., Costandi, 2016; Cozolino, 2016; Presti, 2016; Schwartz & Pare-Blagoev, 2018; Tokuhamma-Espinosa, 2011, 2018), the first and third authors wrote the module content with the fourth author providing input on the fourth module (memory storage and retrieval) and an external expert on embodiment verifying the fifth module (mind-brain-body connection). The content was made available through a website built in Weebly and presented in multimodal form featuring: written text, YouTube videos, recordings of conference presentations, links to external materials, and Padlets and Google Doc worksheets for participants to reflect on their learning.

To accommodate the project's online nature, we adapted the structure of the learning study model commonly used in mainstream education (Amiel & Tan, 2019). Instead of frontloading the modules, we used a three-week cycle where each module contained self-paced content, a focus group with the first author, and an implementation stage. Thus, in the first week of the self-paced work for that module, participants were introduced to a new brain-based principle via the Weebly site. In the second week, the first author met via Zoom with the separate teacher groups in a focus group meeting lasting about 30 minutes. The purpose of these focus group sessions was to enable collaborative reflection on the module content and the participants' teaching in the previous cycle. Also, teachers identified a specific aspect of the new module content they intended to incorporate in their teaching the following week. The third week of the module cycle was the implementation stage, wherein FT teachers observed a lesson taught by another FT teacher, and PT teachers video recorded themselves teaching a lesson (as scheduling challenges made peer-observations impracticable). This final stage of each module provided participants with an opportunity to enact and reflect on how the chosen aspect of a brain-based principle influenced their teaching and learning. Subsequent modules were opened on the Weebly site as earlier ones were completed, beginning the next 3-week cycle. A usual feature of learning studies, particularly those related to teacher practices (Amiel & Tan, 2019), is that research team members also observe lessons being taught; however, due to

COVID-related travel restrictions, this was not possible. Consequently, all teacher reports of their practices are “self-reported practices.”

Immediately following the 15-week program, the participants completed a post-program questionnaire (Q2), also via Qualtrics.¹ Q2 did not feature the demographic items but contained the same 36 brain knowledge statements, plus five open-ended items about the teachers’ experience of participating in the learning study (see Appendix B). As with Q1, the teachers took approximately 10-15 minutes to complete Q2. A week later, the first author interviewed each participant on Zoom. Participants were asked about critical or memorable incidents (Richards & Farrell, 2005) to stimulate discussion of how particular principles informed their teaching and learning process. The semi-structured interviews also served as a platform for participants to express any concerns and ask questions they may have had during the learning study. All interviews and focus groups were recorded, initially transcribed in Zoom, and lasted between 25 minutes to one hour.

As this research project is still ongoing, with the delayed post-interviews yet to be conducted, this paper aims to provide some preliminary insights into the participating teachers’ TPL. Pre- and post-questionnaires and immediate post-program interviews are used as data sources, which allow us to explore the extent of the teachers’ self-reported practices and cognitions about brain-based principles as they developed over the course of the 15-week online learning study program.

Findings and Discussion

The analysis of Q1, Q2, and the immediate post-program interview showed that participating in the online learning study had a notable impact on the seven teachers’ developing cognitions about brain-based principles. As shown in Table 3, overall averages improved from 67.1% (169 of 252 responses) on Q1 to 95.5% (228 of 252 responses) on Q2. The table also shows that every participant scored higher on Q2, with an average gain of 23.4%. Given that none of the seven teachers reported having any background in MBES, the overall improved scores suggest that the gains in Q2 were the result of the teachers’ participation in the learning study.

TABLE 3
Questionnaire Responses

Participants	Total Number of Correct Responses	
	Pre-program Questionnaire	Post-program Questionnaire
T1 (FT)	25/36 (69.4%)	29/36 (80.6%)
T2 (FT)	25/36 (69.4%)	33/36 (91.7%)
T3 (FT)	17/36 (47.2%)	33/36 (91.7%)
T4 (FT)	22/36 (61.1%)	33/36 (91.7%)
T5 (PT)	32/36 (88.9%)	36/36 (100%)
T6 (PT)	24/36 (66.7%)	33/36 (91.7%)
T7 (PT)	24/36 (66.7%)	31/36 (81.1%)
Average:	169/252 (67.1%)	228/252 (90.5%)

The teachers also shared overall positive reflections about their participation in the learning study. A five-point Likert scale question on Q2 asked about teachers’ enjoyment of participating in the program. The overall average score for this item was 4.6/5, demonstrating that participants valued the experience of taking part in the online learning study. In the post-program interviews, the seven teachers expressed positive comments about their experience in the learning study. For instance, T4 “thought it was very useful”, while T1 remarked: “everything that I learned in the five modules [was] really meaningful to me”. T5 “found it interesting working with the materials”, and T3 said that “[i]t was a great experience, and I

¹ Q2 submitted by T8 was incomplete and therefore her data were not included in this paper.

learned a lot, not only about the content but also about the research itself.” The majority of teachers thought that learning about brain-based principles confirmed that their teaching practices were theoretically and empirically sound, as summarized by T7: “The new information I was learning from some of the study materials lined up with my personal teaching philosophy. It gave me that like ‘Oh good. I do know what I’m doing’ feeling.”

While the teachers generally enjoyed the experience of participating in the learning study, the program appeared to have a somewhat limited impact on their self-reported pedagogical practices. For the Q2 item asking if their practices had improved, the overall average was 3.1/5. This is an interesting finding, considering that a total of five weeks (i.e., one week per module) was allocated to the implementation of brain-based principles in the classroom. The specifics of what each teacher did during the implementation week will need additional interrogation; however, the inconsistency between their reflections on the learning study and what it may have done to change practices has potential implications for the TPL process of in-service L2 teachers. It is possible that the online nature of the learning study was insufficiently facilitative for the teachers to enact their new understandings of the MBES principles. As such, future iterations of the online learning study will require inquiry and innovation to better support teachers in the collaborative planning and implementation phases.

Overall, the preliminary findings of this research project demonstrated that the online MBES-focused learning study did shape the participating teachers’ self-reported practices and cognitions. These findings support previous research suggesting that participating in a learning study improves teachers’ MBES knowledge and pedagogy (Amiel & Tan, 2019). Our preliminary findings also agree with studies showing that job-embedded TPL programs are effective in facilitating L2 teachers’ cognitions and practices (Ha & Murray, 2021; Nguyen & Newton, 2021) and that online platforms (e.g., Moodle, Facebook) can have a positive impact on teacher learning and satisfaction (Chen & Huang, 2022; Kiss, 2020). Nevertheless, a more in-depth analysis of our focus group data and future follow-up interviews will most likely reveal a more nuanced picture of how the teachers’ self-reported practices and cognitions about brain-based principles developed at an individual level. For example, given the teachers’ different employment statuses, teaching experiences, and ethnic and linguistic backgrounds, it is possible that the teachers engaged differently with newly learned content, resulting in different learning trajectories. As previous research has demonstrated, L2 teacher learning is a complex, dynamic, and individual process, and the extent to which teachers apply newly learned content in the classroom often varies greatly (Burri & Baker, 2021; 2020). This could also be at play in the current online learning study project. Nonetheless, we believe that our online learning study model holds promise in understanding L2 teachers’ TPL processes and facilitating the long-term development of teachers’ cognitions and pedagogical practices in the classroom.

Conclusion

This study demonstrated the positive impact of a 15-week online learning study program on EFL teachers’ self-reported practices and cognitions of brain-based principles. The relatively small number of teacher participants warrants caution regarding the generalisability of the findings. Also, the participating teachers were highly experienced, and thus it remains to be seen how novice teachers may benefit from the experience in online TPL. As such, we have already begun planning a larger replication of the current learning study. Replicating the online study on a larger scale will provide new and valuable insight into the process of in-service L2 teachers’ developing cognitions and practices in an online setting and eventually allow us to make empirically-informed recommendations for improving TPL in EFL contexts.

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Appendix A

Please read the statements carefully. Indicate whether you believe the statement is: “Correct” or “Incorrect.”
If you do not know, select “I Don’t Know.”

	Correct	Incorrect	I don't know
1. We use our brain 24 hours a day.			
2. On average, males have bigger brains than females.			
3. We only use 10% of our brain.			
4. The brains of males and females develop at different rates.			
5. Brain development has finished by the time children reach puberty.			
6. The body and the brain play separate roles in thinking and in engagement with the environment.			
7. There are critical periods in human development after which certain skills can no longer be learned.			
8. Information is stored in neural (cell) networks in the brain.			
9. Learning is due to the addition of new cells to the brain.			
10. Individuals learn better when they receive information in their preferred learning styles (e.g., auditory, visual, kinesthetic).			
11. Learning occurs through changes to the connections between brain cells.			
12. All gestures improve the language learning process.			
13. Learning is due to modifications in the brain.			
14. Forming new connections in the brain stops once people reach a certain age.			
15. Learning should be spaced out over time and/or over several lessons.			
16. Focused attention is essential for the formation of new memories and storage of new information.			
17. Maintaining a positive atmosphere in the classroom helps promote learning.			
18. Repeated practice of learned material or a skill will help to consolidate it in long-term memory.			
19. Touch distracts us from creating meaning.			
20. Explaining the purpose of a learning activity helps engage students in that activity.			
21. Images and graphics in course materials are unnecessary and do little to enhance learning.			
22. Meaningful feedback accelerates learning.			
23. Information studied in shorter periods of time is better remembered than the same information studied over longer periods of time.			
24. Movement improves cognitive functioning, including language learning.			
25. The mind connects new information to prior knowledge.			
26. Low stakes tests (such as formative quizzes) do not enhance learning.			
27. Sleep has no impact on the process of consolidating memories.			
28. Emotions can affect human cognitive processes, including attention, learning and memory, reasoning, and problem-solving.			
29. Human brains are relatively as unique as fingerprints.			
30. Stress improves the ability of the brain to encode, form, and recall memories.			
31. Intelligence is fixed at birth.			

32. Production of new neuronal connections in the brain continues over the lifetime.			
33. Multitasking improves productivity and learning efficiency.			
34. Human memory works much like a digital recording device or video camera in that it accurately records the events we have experienced.			
35. Human brains seek and often quickly detect novelty.			
36. Stories facilitate memory formation and learning.			

Appendix B

Please indicate how much you enjoyed participating in this learning study project (5 = very much; 1 = not at all):

To what extent do you feel that your knowledge and teaching skills improved as a result of participating in this research project? (5 = significant improvement; 1 = no improvement at all):

Now that you've completed the 15-week program, indicate how valuable you find knowledge of the workings of the brain and its influence on learning:

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I find scientific knowledge about the brain and its influence on learning valuable for my teaching practice.					
I find scientific knowledge about the brain and its influence on learning valuable for course development.					
I find scientific knowledge about the brain and its influence on learning interesting.					
I am interested in learning more about the brain and its influence on learning.					

What is one point about the learning study program you wish to discuss with Michael during the interview? This can be an area for improvement in the program or something significant you felt contributed to your learning or teaching.

Is there anything else that you would like to share with the researchers? You can reply in English or Japanese.