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Castledown

Uncovering how in-service teachers are learning about technology in language teaching and learning

Yurika Ito
Kanagawa University, Japan
yurika.ito@akane.waseda.jp

As emerging technologies rapidly evolve, language teachers in the 21st century face an increasing challenge in determining how to integrate them into their language classrooms. The existing literature emphasises that a crucial element for successful technology integration is for teachers to hold sufficient proficiency in technology and adopt active attitudes towards their own professional learning. While an abundance of learning resources is currently available, mostly due to the proliferation of the Internet, much still remains unknown about what language teachers are actually doing to enhance their knowledge and skills in technology. The current study, therefore, examined how in-service language teachers are learning about technology for instructional purposes and their reasoning behind using specific learning methods. Employing a survey research design, data were collected through an initial wide-scale questionnaire (n=179), in-depth interviews (n=19), and a post-interview questionnaire (n=19) at three different time points in the early 2020s. The findings suggest that the language teachers were relying on a wide variety of online materials and tools—searching the web, reading mailing lists, connecting with teachers via social media, and watching videos, among others. Due to reasons related to finances, geographical locations, time, prevailing social situations, and attitudes, they appeared to be choosing to use informal and self-directed modes of learning over formal teacher training courses. Based on the findings, the current challenges facing language teachers who are learning about technology were identified, and implications for future technology preparation in language teacher education are suggested.

Keywords: language teachers, teacher professional learning, technology preparation, language teaching, CALL teacher training

Introduction

With various technologies, such as artificial intelligence, machine translation software, and chatbots, developing at a rapid pace, the teaching landscape is continually shifting. In order for language teachers to implement these technologies successfully into their classes, they need to learn about new technologies, learn how to use them, and learn how they best fit within their own teaching context. Since the mid-2000s, numerous scholars have advocated the notion that language teachers need to acquire adequate skills and knowledge related to technology (Hubbard & Levy, 2006; Son & Windeatt, 2017; Torsani, 2016; Zhao & Tella, 2002). However, the reality is that not many teachers have access to formal training programmes, often due to financial and geographical barriers (Hanson-Smith, 2016; Hubbard, 2008, 2018). Even if they have access to formal training programmes, it is not always guaranteed that the programmes are effective nor useful for teachers who are using technology for instructional purposes (Kessler, 2006, 2007).

As many language teachers have no choice but to learn on their own, it is not entirely unexpected that they are turning to informal means of learning (Son, 2018). The prevalence of the Internet, for instance, has led to an increase in various online learning resources, such as blogs, videos, mailing lists, and social media (Hanson-Smith, 2016). Although there are more opportunities to learn about technology for teaching purposes than ever before (Stockwell, 2009), not much is known about what language teachers in the 21st century are actually doing to enhance their knowledge and skills in technology (cf. Egbert et al., 2002; Kessler, 2006; Son, 2014). To support language teachers' learning and offer teachers better technology training, there is a need to uncover the learning experiences of language teachers who are currently trying to learn about technology.

Background

Formal CALL teacher education: Realities and challenges

As "language teachers are the pivotal players" who "select the tools to support their teaching and determine what CALL applications language teachers are exposed to and how learners use them" (Hubbard, 2008, p. 176), it comes as little surprise that within the field of computer-assisted language learning (CALL), research into CALL teacher education has increasingly become more mainstream (e.g., Hubbard, 2008, 2018; Hubbard & Levy, 2006; Kessler, 2021; Son, 2018; Son & Windeatt, 2018; Torsani, 2016). One of the common themes in the earlier literature has been on uncovering the effectiveness of formal training courses in facilitating teachers' knowledge and skills in CALL (Son, 2018). For example, Kessler's (2006) well-cited study employing a survey research design investigated teachers' perceptions of CALL preparation. Primarily through a 32-item questionnaire which was completed by 240 graduates of North American TESOL master's degree programmes, the researcher examined whether the teachers were satisfied with the CALL training that they received.

The results indicated that participants generally did not have access to formal CALL teacher education, and those who did receive some kind of training were often dissatisfied with their past training. In all, 51% of them indicated that their training was "extremely ineffective," and 25% of them indicated it was "somewhat ineffective" (p. 29). Similarly, in another commonly referenced study, Kessler (2007) examined the extent of training in TESOL masters programmes in North America. Using a questionnaire which was responded by 108 TESOL master's degree graduates as the main data source, the researcher found that a large proportion of respondents reported that they disagreed that their degree programme prepared them to effectively "use computer-based materials for speaking skills," "create computer-based audio materials for instruction," "use multimedia for instruction," "make decisions regarding the integration of technology in my classes," and "make effective decisions regarding the use of technology for instructional purposes (Kessler, 2007). Another worthwhile finding was that respondents perceived informal teacher preparation as more effective than formal teacher preparation, which is likely to explain why they were more likely to turn to informal ways of learning instead.

Research on language teachers' ways of learning about technology

Egbert et al.'s (2002) study was one of the first studies placing a focus on understanding the ways in which language teachers were learning about technology using alternative sources. Drawing on data from a questionnaire which received a total of 20 responses from in-service language teachers who had completed a CALL course at a mid-western university in the US during the period between 1996 and 2000 and follow-up interviews, the researchers tried to examine how teachers were expanding their knowledge and skills in technology. Since completing their course, many participants reported that they had relied on their peers/colleagues (n=7), the web (n=5), books (n=4), conferences (n=4), and journals (n=4). Although 13 out of 20 participants reported that they subscribed to a professional listserv (i.e., TESLCA-L) while they were enrolled in the course, only a small proportion of teachers (n=2) were using it to learn about technology. One participant reported in the interview that since they did not have time to read the messages and did not find any of the discussion topics to be particularly interesting, they decided to unsubscribe from it.

In the aforementioned Kessler's (2006) study, in addition to examining the graduates' satisfaction towards the CALL training they received, the researcher also looked at the way they were expanding their knowledge and skills in CALL after graduation. The participants reported to be utilising alternative sources of learning, such as the use of listservs (n=240), professional conferences (n=220), websites (n=210), colleagues (n=180), and journals (n=160) instead of relying on formal training.

More recently, Son (2014) carried out a similar small-scale study investigating language teachers' uses of various tools to enhance their professional competencies in technology. The results of a questionnaire which received 45 responses from CALL practitioners revealed that many respondents were

frequently making use of self-directed strategies, such as reading journal articles, books, blog posts, and email list messages, searching the web, and connecting with other teachers online via social networks. Compared to Egbert et al.'s (2002) study which was set in the early 2000s, it appeared that the teachers in Son's (2014) study were making more use of online tools.

Research into CALL teacher education has been not particularly scarce over the past decade or two, and there have recently been studies looking into how teachers are learning about technology through the use of specific learning approaches, such as competency-based learning (e.g., Egbert et al., 2019) and collaborative situated learning (e.g., Kozlova & Priven, 2015), and specific resources, such as Massive Open Online Courses (MOOCs) (e.g., Koukis & Jimoyiannis, 2019), seminars (e.g., Stockwell, 2009), training courses (e.g., O'Dowd, 2015) and online communities of practice on social media platforms (e.g., Qi & Wang, 2017). However, little is known about how language teachers are learning about technology. Since Son's (2014) study, this particular topic seems to be somewhat neglected.

Current literature gaps

Kessler's (2006, 2007) studies which examined language teachers' perceptions of formal CALL training programmes illustrated how many participants were generally dissatisfied with the formal training that they received during their TESOL degree courses. The small-scale studies conducted by Egbert et al. (2002), Kessler (2006), and Son (2014) shed light on how some language teachers were learning about technology using informal means, but the issue of these studies is that they were conducted more than a decade ago and small in scale. As an attempt to conduct a more up-to-date and larger-scale study that captures how language teachers are learning about technology, the following research questions were addressed in the present study:

- How are in-service language teachers in the early 2020s learning about technology in language teaching and learning?
- What are the contributing factors underlying their ways of learning?

Methods

Data collection instruments and procedure

Employing a survey research design approach (Andres, 2012), data were collected via an online-based questionnaire, individual in-depth interviews, and a post-interview questionnaire. The initial questionnaire was developed with reference to the aforementioned related studies conducted by Egbert et al. (2002), Kessler (2006), and Son (2014). To highlight any problematic questions and minimise errors during the main study, a pilot study was carried out (Dörnyei & Taguchi, 2010). A pilot test was conducted with 37 language teachers who were teaching at the same Japanese private high school in July 2019. Revisions were made based on the pilot study findings, and the initial questionnaire was

posted in several online teacher communities multiple times during a four-month period between June 2020 and September 2020. The objective of the initial questionnaire was three-fold: (1) to understand the respondents' backgrounds (e.g., age, professional role, teaching experience, teaching context); (2) to understand how they were using technology in their classes; and (3) to understand what they were doing to learn about technology.

At the end of the questionnaire, respondents were asked to leave their email addresses if they were willing to be interviewed. The semi-structured interviews, which were carried out over the course of eight months in 2020 and 2021 (i.e., between August 2020 and March 2021) were conducted to delve deeper into the questionnaire responses and ask in more detail about their experiences in learning about technology. They all took place online using a video conferencing tool (i.e., Zoom) as it was difficult to meet in person due to the pandemic. They were conducted during a year-long period between 2020 and 2021 and were, on average, 57.3 minutes. The interview data were all transcribed using Zoom's automated transcription feature, though the researcher went through the transcript to look out for mistakes and corrected them accordingly. All the interviewees were asked to participate in the follow-up interview questionnaire in March 2022. To see whether there were any drastic changes of their learning habits during the two-year period, in the follow-up questionnaire, the interviewees were asked the same question including in the initial questionnaire distributed in 2020 about their ways of learning about technology.

Participants

A total of 179 in-service language teachers in Japan participated in the initial questionnaire. As shown in Table 1, approximately half of the respondents were female (50.8%), and their age group ranged from 20-29 to 60-69, with the most common age group being 40-49. The respondents were teaching in various contexts, with 82 language teachers teaching at a secondary school (45.8%), including junior/middle school and high school, 73 language teachers at a university (40.8%), 11 language teachers at a private language school, six language teachers at a primary school (3.4%), and three language teachers working freelance/self-employed (1.7%). Moreover, the majority of respondents had been teaching for more than five years (94.3%).

Table 1. Initial questionnaire respondents' background information (n=179)

	Frequency (Percentage %)
Gender	
Female	91 (50.8%)
Male	85 (47.5%)
Prefer not to say	3 (1.7%)
Age	
20-29	8 (4.5%)
30-39	45 (25.1%)
40-49	80 (44.7%)
50-59	32 (17.9%)
60-69	14 (7.8%)
Main professional role	
Primary school language teacher	6 (3.4%)
Secondary school language teacher	82 (45.8%)
University language teacher	73 (40.8%)
Private language school teacher	11 (6.1%)
Freelance/self-employed teacher	3 (1.7%)
Other	4 (2.2%)
Employment status	
Full-time (permanent/tenured)	100 (55.9%)
Full-time (contract)	36 (20.1%)
Part-time (contract)	27 (15.1%)
Other (e.g., self-employed, business owner, freelance)	16 (8.9%)
Teaching experience	
Less than 1 year	2 (1.1%)
1-5 years	7 (3.9%)
6-10 years	36 (20.1%)
11-15 years	40 (22.3%)
16-20 years	31 (17.3%)
21-25 years	29 (16.2%)
More than 25 years	33 (18.4%)
Not specified	1(0.6%)

All the initial questionnaire respondents were asked if they would be willing to take part in the interviews, and 19 of them voluntarily accepted to be interviewed. After the interviews, they were all asked to fill out a post-interview questionnaire, and all 19 interviewees responded to it. Half of the interviewees were female, and the age group ranged from 20-29 to 50-59, with the most common age group being 40-49. The interviewees' nationalities varied, with six from America, two each from Britain, Australia, and Canada, one each from Ireland, Malaysia, Indonesia, and Trinidad and Tobago. They resided in different parts of Japan, including the Kanto region (e.g., Tokyo, Kanagawa, Chiba,

Ibaraki, Saitama), Chubu region (e.g., Shizuoka, Nagoya), Kansai region (e.g., Osaka), and Kyushu region (e.g., Fukuoka, Kumamoto). Apart from one interviewee, the other 18 interviewees had more than five years of teaching experience, and 13 out of 19 were teaching at the university level.

Table 2. Interviewees' background information (n=19)

Pseudonym (sex)	Age	Nationality	Teaching experience	Teaching context
Interviewee A (M)	30–39	Indonesian	6–10 years	Originally private high school but moved to a private language school
Interviewee B (F)	30–39	Malaysian	11–15 years	University
Interviewee C (F)	50–59	Australian	More than 25 years	Junior high school/ teacher training programmes
Interviewee D (F)	40–49	American	16–20 years	University
Interviewee E (F)	50–59	Canadian	More than 25 years	University
Interviewee F (M)	30–39	American	11–15 years	University
Interviewee G (F)	40–49	American	21–25 years	University
Interviewee H (F)	40–49	British	11–15 years	Self-employed
Interviewee I (F)	40–49	Irish	21–25 years	University
Interviewee J (M)	40–49	American	11–15 years	Language school (Business owner)
Interviewee K (M)	60–69	American	More than 30 years	University
Interviewee L (M)	40–49	British	16–20 years	University
Interviewee M (F)	20–29	Trinidadian and Tobagonian	1–5 years	High school
Interviewee N (F)	40–49	Australian	21–25 years	University
Interviewee O (F)	40–49	American	15–20 years	Primary school
Interviewee P (M)	40–49	Australian	16–20 years	University
Interviewee Q (F)	40–49	Canadian	16–20 years	University
Interviewee R (M)	40–49	British	16–20 years	University
Interviewee S (M)	30–39	American	11–15 years	University

Data analysis

The data from each of the aforementioned instruments were analysed separately: The closed-ended questions collected in the initial and follow-up questionnaires were statistically analysed using Microsoft Excel, and the interview responses were analysed using inductive content analysis. The transcripts were read repeatedly to identify common codes, categories, and themes (Kyngäs, 2020). Once the raw results were analysed, they were later merged and interpreted thematically in accordance with the guiding research questions and past literature.

Methodological limitations

The study used a convenience sampling method, and all the participants were solicited online. It should therefore be stated from the beginning that the sample consisted of language teachers who had some basic technical knowledge and skills and knew how to fill in an online questionnaire, and those who were not using these online spaces were beyond the scope of the study. Hence, the findings of the study will be limited to the understanding of language teachers who are using online tools to a certain extent. Another methodological limitation worth mentioning is the timing of the study: The initial questionnaire was first distributed only after the onset of the COVID-19 pandemic in June 2020. In March 2020, the Japanese government declared a state of emergency, and, as a result, many schools and universities across the country had no choice but to conduct online classes in lieu of in-person classes. Since most teachers, including those who were once against using technology in classes, were using some kind of technology to teach their classes during this period, the pandemic likely influenced their responses.

Results

In the initial questionnaire, the majority of the respondents (91.1.%) indicated that they were using some kind of technology to teach their classes, while a small minority (8.9%) indicated that they were not using any technology. Approximately two-thirds of the respondents (62.6%) reported that they were doing something specifically to learn about technology, though a third were not. The respondents were also asked to indicate how often they did certain activities to learn about technology for instructional purposes. As demonstrated in Table 3, respondents were learning about technology in various ways: More than half of them indicated that they were searching the web (71.5%), watching videos (59.8%), reading blog posts (50.3%), reading email list messages (53.1%), connecting with teachers on Social Networking Sites (SNSs) (64.2%), and asking co-workers (63.1%) at least once a week to learn about technology. Moreover, although to a relatively lesser degree, approximately a third of them reported that they were reading journal articles (31.8%) and books (34.1%). The results also revealed that more than half the respondents reported that they "rarely" or "never" attended face-to-face academic conferences (61.5%) and online conferences (62.6%) and took face-to-face lectures/courses (70.9%) and online lectures/courses (63.1%) as a means of learning about technology.

Table 3. Initial questionnaire respondents' ways of learning about technology (n=179)

Type of activity	Daily	2–3 times a week	Once a week	Once a month	Twice a year	Once a year	Rarely	Never
Attend face-to-face (not online) academic conferences	5 (2.7%)	2 (1.1%)	2 (1.1%)	8 (4.5%)	34 (19.0%)	18 (10.1%)	34 (19.0%)	76 (42.5%)
Attend online conferences	0 (0.0%)	2 (1.1%)	4 (2.2%)	25 (14.0%)	23 (12.8%)	13 (7.3%)	39 (21.8%)	73 (40.8%)
Take face-to-face (not online) lectures/ courses	5 (2.8%)	2 (1.1%)	6 (3.4%)	6 (3.4%)	16 (8.9%)	17 (9.5%)	28 (15.6%)	99 (55.3%)
Take online lectures/ courses	1 (0.6%)	8 (4.5%)	7 (3.9%)	15 (8.4%)	19 (10.6%)	16 (8.9%)	30 (16.8%)	83 (46.4%)
Search the web	66 (36.9%)	31 (17.3%)	31 (17.3%)	29 (16.2%)	3 (1.7%)	1 (0.6%)	3 (2.8%)	13 (7.3%)
Watch videos	41 (22.9%)	30 (16.8%)	36 (20.1%)	28 (15.6%)	8 (4.5%)	3 (1.7%)	11 (6.1%)	22 (12.3%)
Read journal articles	21 (11.7%)	18 (10.1%)	18 (10.1%)	28 (15.6%)	12 (6.7%)	9 (5.0%)	23 (12.8%)	50 (27.9%)
Read books	19 (10.6%)	21 (11.7%)	21 (11.7%)	28 (15.6%)	16 (8.9%)	12 (6.7%)	23 (12.8%)	39 (21.8%)
Read blog posts	23 (12.8%)	28 (15.6%)	39 (21.8%)	26 (14.5%)	7 (3.9%)	7 (3.9%)	16 (8.9%)	33 (18.4%)
Read email list messages	32 (17.9%)	34 (19.0%)	29 (16.2%)	15 (8.4%)	5 (2.8%)	4 (2.2%)	16 (8.9%)	44 (24.6%)
Connect with teachers on Social Networking Sites (SNSs)	47 (26.3%)	39 (21.8%)	29 (16.2%)	15 (8.4%)	6 (3.4%)	3 (1.7%)	11 (6.1%)	29 (16.2%)
Ask co-workers	33 (18.4%)	43 (24.0%)	37 (20.7%)	28 (15.6%)	6 (3.4%)	3 (1.7%)	12 (6.7%)	17 (9.5%)
Observe other teachers' classrooms	6 (3.4%)	10 (5.6%)	12 (6.7%)	21 (11.7%)	29 (16.2%)	9 (5.0%)	36 (20.1%)	56 (31.3%)

In the initial questionnaire, they were also asked to indicate if they wanted to learn about technology in the future, and 84.9% of the respondents responded "yes." In addition to their interest in online teaching, they expressed a desire to learn about various interactive tools such as Learning Management Systems (LMSs), educational software, and AI technologies that could potentially be integrated into their classes. On the other hand, 15.1% of them chose "no," and some of them left comments explaining why they did not want to learn about technology in the future. As indicated in the following examples, four respondents explained how they did not want to learn about technology because they were not in favour of using technology to teach in their classes:

> I prefer a "less is more" or "teaching unplugged" approach: Focusing on what doesn't change about teaching and student interactions rather than the "flavour of the week. (Initial questionnaire respondent #1)

> It makes new things possible but opens up huge worlds of tech problems that can ruin your lesson. I like to keep things simple. (Initial questionnaire respondent #2)

Three initial questionnaire respondents also commented that they did not feel that they needed to learn any more as they had enough knowledge to use technology in their classes, as demonstrated in the following comment:

> I think I have enough basic knowledge at the moment and don't wish to clutter my brain with anything other than what I deem is necessary for my current teaching. (Initial questionnaire respondent #3)

Another initial questionnaire respondent explained that since she was close to retirement, she did not feel the need to learn more about technology:

> As I only have a few years before retirement, I feel I currently have enough knowledge to function. Also, I don't want schools to expect me to be able to use lots of tech when they don't supply any hardware or software or any money towards purchasing any or any training. I teach at four universities, and none offered any help towards going online this year. (Initial questionnaire respondent #4)

From respondent #4's comment, it can also be inferred that since the universities that she teaches at do not offer any financial or technical support in using technology, she did not feel the necessity to use technology in her classes.

The interviews, which were carried out to understand the questionnaire responses in more depth, focused more specifically on uncovering the underlying factors influencing their decisions about their ways of learning about technology. Firstly, a handful of interviewees used time as a reason for choosing online modes of learning. For instance, Interviewee A, who lost his job in Japan during the pandemic, indicated that he did not have the financial capacity to pay to attend events that cost money until he had funds from his new workplace which he could use for his professional development:

> I never pay. I always attended the free ones because I didn't have a job for a while because of COVID. I didn't have any income. But right now, if there is an interesting seminar and I have to pay 20 dollars, yeah sure, okay... They [My new workplace] have a lot of studying funds.

In a different interview, Interviewee B, who was teaching English part-time at a university in Fukuoka, which is located far away from the city centre where many professional learning events take place, explained how she preferred learning online as "face-to-face meetings take a lot of time and energy." She also suggested that the reason why she wanted to connect with other teachers online on SNSs was because she did not have a lot of opportunities to interact with other teachers because her workplace does not have a communal space where full-time and part-time teachers can mingle and exchange ideas about teaching:

> Back in Malaysia, I was a schoolteacher. We had a big staff room, and all the teachers were there, and it was easy to talk to your colleagues about things, discuss things, and ask for their feedback, but here (in Japan), it's hard. I do have one or two people who I can talk to but no more than that.

The pandemic also appeared to worsen the ongoing problem of teacher isolation. Even for teachers who had close ties with their work colleagues prior to the pandemic, the format of working from home made it difficult for them to talk to one another and ask for help:

> I'm working remotely most of the time, so if I need help from my workmates, they're not here. If we were all together in an office, all I needed was to just reach over across the desk and say, 'Help me.' (Interviewee C)

In the post-interview questionnaire, although 12 out of 19 interviewees indicated that they were no longer teaching online and returned to face-to-face teaching, the results seem to indicate that many teachers still made use of various online materials and tools. For example, many interviewees appeared to be attending online conferences more than face-to-face conferences: In 2020, seven interviewees reported that they were attending online conferences at least twice a year, whereas six interviewees reported that they had "never" attended online conferences. On the other hand, in 2022, an additional six interviewees reported that they were attending online conferences at least more than twice a year, and only one reported that they had "never" attended an online conference. Face-to-face conferences appeared to become a less popular option, as evident by the fact that in 2022, nine additional interviewees (i.e., a total of 14 interviewees) reported that they had "never" attended face-to-face conferences. Searching the web, watching videos, reading blog posts, and connecting with teachers on SNSs appeared to be a frequently used method throughout the past two years. In both questionnaires, only a handful of interviewees indicated that they were taking courses, particularly face-to-face ones, and observing other teachers' classes.

Discussion

How teachers are learning about technology

The first research question addressed the ways in which language teachers were learning about technology. It should be noted at the beginning of this section that since the study primarily relied on self-reported data collected through an online questionnaire which received 179 responses and online interviews with 19 questionnaire respondents, the findings will not likely paint the whole picture of how all language teachers in Japan are enhancing their knowledge and skills in technology. As evident by the fact that only a handful of relevant studies have thus far been conducted, there has been limited understanding of how language teachers learn about how to incorporate technology into their teaching practices. Such studies as Egbert et al. (2002), Kessler (2006), and Son

(2014) were not only small-scale, but almost a decade has passed since Kessler's (2006) and Son's (2014) study and over two decades have passed since Egbert et al.'s (2002) study. Hence, despite the aforementioned methodological limitations, the current study still provides a fresh and updated understanding of what some language teachers in the 2020s are doing to learn about technology.

Many participants in the study were leveraging a range of different resources, tools, and methods. They appeared to be focusing more on self-directed informal means of learning rather than formal means. In particular, some of the most popular modes of learning included: searching the web, watching videos, and connecting with teachers using SNSs. Participants also reported that they were frequently reading relevant blogs, research articles in academic journals, books, and email list messages, although to a relatively lesser degree. On the other hand, observing other teachers' classes and attending in-person courses and conferences appeared to be the least preferred way of learning about technology.

In comparison to Egbert et al.'s (2002) study, which was conducted over twenty years ago, it seems that it has increasingly become common to learn using digital materials and tools, including web search engines, videos, SNSs, and email lists, in recent years. These results seem to align with Son's (2014) study which was carried out when smartphones, tablet computers, and other digital devices were already prevalent. It is noteworthy, however, that a subtle discrepancy existed in the distribution of the popular and less common activities found in Son's (2014) study and the current study: The participants in the current study appear to prefer attending online courses, conferences, and seminars to in-person options. However, participants in Son's (2014) study indicated that they were attending in-person courses, conferences, and seminars slightly more than online options. Two possible reasons can account for the disparity: Firstly, Son's (2014) study was conducted prior to the pandemic, whereas the initial questionnaire was conducted amidst the pandemic when the Japanese government declared a state of emergency and enforced strict social distancing measures. Participants presumably made use of the available resources which they could access from their homes. The pandemic was likely to work as a push factor for participants to rely on online modes of learning, but another possibility is that online modes of learning have increasingly become the norm for teacher professional learning activities over the past decade. Although it is difficult to say at this point how teachers will learn once the pandemic completely ends, the results from the current study's post-interview questionnaire which was distributed two years after the initial questionnaire was distributed, seem to indicate that participants are still continuing to learn about technology using professional learning resources found online.

The underlying factors behind the identified learning trends

Going beyond the scope of the studies conducted by Egbert et al. (2002), Kessler (2006), and Son (2014), the present study also examined the underlying factors that could explain the aforementioned learning trends. Seven main factors

that appeared to be influencing the ways in which participants were learning about technology in language teaching and learning were identified from the study's findings.

Firstly, one obvious factor was related to finances. Many participants reported that they were choosing to learn about technology using free resources and attending budget-friendly events which were often free of charge. Interviewee A, who indicated that he got laid off at the beginning of the pandemic, and Interviewee B, who was teaching part-time at a university, commented how they were reluctant to spend money on costly materials and events. Interviewee B explained how he joined a Facebook group which was targeted at teachers who were interested in learning about how to teach online and attended several free online sessions which were organised by some of the main group members and promoted frequently on the group's main discussion page. On the other hand, several tenured full-time teachers, including Interviewee C, indicated that they had been regularly attending academic conferences related to topics such as CALL, educational technology, and teaching, which, in many cases, require a considerable fee. Interviewee A also indicated that as he landed a new teaching job in Sri Lanka which provided him with professional development funds, he was now able to afford paid resources and events. These results demonstrate how financial constraints can possibly inhibit teachers from accessing certain resources and impede their learning opportunities.

Time is another factor that seems to influence how participants are learning about technology and their motivation towards learning about technology. Teachers have a reputation for being busy, with many of them working long hours carrying out various tasks, such as preparing for classes, grading homework, and performing administrative duties (Kim, 2019). The participants in the study were no exception to such a heavy workload, and in addition to their everyday work duties, their daily lives were consumed with other activities: For instance, four interviewees reported that they had young children for whom they needed to care, two interviewees were doctoral students, and one interviewee even claimed that she was undergoing chemotherapy while teaching. Considering the busy nature of teachers, it is not surprising that a number of participants indicated that they were not doing anything to learn about technology and the ones who claimed that they were learning opted to learn through online platforms rather than other learning options, like observing one's classes. Searching online, watching how-to videos on YouTube, reading posts shared in online teacher communities, and attending online events can all be done in the comfort of one's home. This not only cuts down on travel expenses but also saves time. Learning online may also accommodate teachers' needs better, as they can capitalise upon the flexible nature of online options, enabling them to access these resources anytime of the day.

Closely related to financial and time-related factors, geographical factors may also explain why many participants chose to learn online. Interviewee B explained that as many conferences and professional learning events are held in major cities in Japan, such as Tokyo and Osaka, she is often not able to participate in them as she was living in a rural part of southwestern part of Japan.

She commented how online conferences and events provide her with a learning opportunity without the need to spend much time travelling and incurring expenses. Many participants in the study who reported that they were making use of online teacher communities on SNSs regularly commented how they were finding information about such online events through the online communities. For example, Ito's (2023a) study which investigated a technology-focused online teacher community for language teachers mostly residing in Japan, including both metropolitan and rural areas, found that language teachers in differing parts of Japan were connecting on the Facebook platform to share information about upcoming events and discuss queries related to technology in language teaching and learning, providing further evidence for the phenomenon that teachers are increasingly connecting online as a means to discuss matters related to teaching practice (e.g., Ito, 2023b, Yildirim, 2019).

Moreover, prevailing social situations may have affected the way language teachers learn about technology. One of the most prominent socio-contextual factors which was likely to affect the findings was the pandemic. As many teachers had no choice but to teach online because of pandemic-induced social distancing measures (Turnbull et al., 2021), it is likely that many participants reported that they were motivated to learn about technology in the first place. Because of such a crisis, there was likely to be a higher demand for professional learning resources which are accessible from their home. Even though the end of the pandemic is near in sight, there are other contextual influences which may require teachers to opt to learn online. Before the pandemic, for instance, Motteram et al. (2020) illustrated how Syrian language teachers who were residing in the Zataari refugee camp in Jordan utilised WhatsApp to aid their professional learning. As other disasters, such as the Russian invasion of Ukraine and the 2023 Turkey-Syria Earthquake, unfold one after another, it is likely that online learning will continue to be an attractive alternative to acquiring knowledge and skills in technology for many teachers, particularly those teaching in difficult circumstances.

Further, the amount of support they received from their co-workers and institutions appeared to determine whether language teachers attempted to find alternative sources of learning outside of their workplace. Nearly half of the participants indicated that they enquired about technology with their co-workers when they required assistance. Interviewee C, for example, explained that she would often rely on her co-workers to teach her how to use a certain technology for her classes, though she commented that working from home during the pandemic took a toll on her work relationships. As she felt that she engaged less with her co-workers, she claimed that she reached out to other teachers online and attended various professional learning events virtually. Some interviewees, however, reported that they maintained a tight relationship with their co-workers during the pandemic. For example, Interviewee D reported that her co-worker hosted an online session at the beginning of the pandemic so that they could learn how to use their LMSs together. Interviewee E also reported that her university provided them with an instruction manual of how to use the required online platform and several of her co-workers "talked

back and forth" when they encountered problems. Similarly, Interviewee F commented how his department committee offered the faculty with several training sessions on how to transition from face-to-face teaching to online teaching and additional sessions where they were able to share their concerns and "spit-ball ideas" and receive feedback. Not all interviewees were as lucky as them to have a close-knit team and support from their institutions; rather, several interviewees, including those who were teaching part-time at multiple universities (e.g., Interviewee B, E, G) and those who were self-employed (Interviewee H) indicated that they were left on their own devices to find ways to learn how to teach online and as a result, turned to different sources of learning. Interviewee G, for instance, explained that one of her universities did not offer any help as she could not speak Japanese, so she ended up searching on Google and watching videos on YouTube to figure out how to use different technologies. Both Interviewee B, who was working part-time, and Interviewee H, who was self-employed, reported that they had joined online teacher communities on SNSs for those who were interested in learning about online teaching since they had no one else to turn to. Based on the interviewees' responses, the level of support from their co-workers at their workplace, possibly linked to the employment status of the teachers, seems to play a role in whether they will seek further support.

Tightly associated with this, socio-cultural factors may also play a role in deciding teachers' ways of learning. Many participants reported that they hardly ever observe each other's classes. Even the few interviewees who reported that they had met up with their close colleagues online to learn together, appeared not to be observing one another. Peer classroom observation has been widely acknowledged as potentially being an effective method in developing language teachers' teaching practice (e.g., Mann, 2005; Richards & Farrell, 2005), but such a learning method seems not to be prevalent in Japan, a country where a top-down hierarchical workplace culture exists. For example, the sempai-kohai system, where the "sempai" who is the more experienced or senior individual is ranked above the "kohai" who is the less experienced or junior individual, is deeply rooted in the Japanese work structure and culture (Davies & Ikeno, 2002). While none of the interviewees explicitly discussed the sempai-kohai system, it is likely that these strong hierarchical relationships make it challenging for teachers to exchange ideas and feedback, particularly if they vary in age. In fear of losing authority, the "sempai" teacher may be reluctant to ask the "kohai" teacher for advice or help. Rather than asking their co-workers or observing each other's' classes, teachers may be more willing to use online modes of learning to learn about technology, without having to worry about what their colleagues think. For instance, in Hur and Brush's (2009) study, some teachers were participating in online teacher communities to ask teaching-related questions or share their concerns which they would otherwise not be able to at their local school.

Finally, the teachers' personal motivation towards learning about technology is likely to influence their ways of learning about technology. In the present study, not all teachers were motivated to use technology in the first place:

Those who have little or no motivation to use technology in their classes tend not to be keen on learning about technology in the first place. Other teachers who were thinking about changing professions and those who were about to retire reported that they did not feel that they needed to learn about how to use technology for instructional purposes as they were going to leave the teaching profession soon. Since learning about technology requires time and commitment on the teachers' end, those who are not motivated to use and learn about technology are less likely to learn through formal means of learning, such as attending extensive courses, and may be willing to choose learning methods, such as searching on the web and watching videos, which require comparatively less effort and are less financially committed.

Implications and conclusions

Tying the findings back together: Implications for practice

Due to various factors related to finances, time, location, social context, collegiality, and motivation, many language teachers in Japan appeared to be choosing to learn about technology using a range of different online tools and resources, including online conferences, web search engines, SNSs, blogs, and email lists, which fit better with their needs and demands. One notable outcome of this investigation was that despite being required to use technology from their institutions, the vast majority of the teachers had little or no support at their workplace and were often left on their own to decipher ways to learn how to teach using technology. Without knowing much about how to utilise these resources effectively and often through trial and error, teachers were figuring out the best way to learn about technology. As such, it would be ideal for teachers to be provided with a better support system at their workplace, where they can rely on whenever they face any challenges or problems, and offered more opportunities to learn about technology. Because of budgetary and time restrictions, it may be challenging for institutions to hire experts who can assist teachers in using technology for instructional purposes. However, institutional administrators and other relevant stakeholders can organise opportunities where teachers with varying experiences can get together and exchange ideas, concerns, and queries. Opting for a hybrid format for the sessions would likely provide the teachers with the flexibility to select the format that best suits their individual needs. Having such sessions from time to time allows them to meet up with their colleagues regularly and may even consequently lower the affective filter to talk to other teachers regardless of seniority. A close-knit teaching community at the workplace will not only enable them to build stronger professional relationships but also foster a supportive and collaborative environment, which in the long run will likely have a positive impact on their teaching practice as well as their overall job satisfaction.

At the pre-service level, teacher educators should focus on developing student teachers' self-directed learning skills so that they are capable of learning about technology on their own throughout their long professional careers.

They can introduce popular resources, tools, and strategies which can potentially be used to help navigate their ways of using technology in their classes, explore their potential applications, and uncover any shortcomings they may present. In particular, when it comes to using social media for professional purposes, teachers who are inexperienced in using social media can face a learning curve (Krutka et al., 2017). It is, therefore, crucial for teacher educators to inform student teachers what learning opportunities are available and teach them how they can capitalise upon them to the full extent while unveiling their constraints.

Limitations and future research directions

Several limitations were inherent to the present study. Firstly, since the participants were all recruited online, the findings merely capture a partial reality of how language teachers are learning about technology. The convenience sampling yielded a high number of participants, but teachers who were not present online were beyond the scope of the study. It is likely that since the participants were already making use of online platforms, they were motivated to learn about technology to begin with. The next step of the study is, therefore, to expand the scope of the sample and examine how teachers who are less present online are learning about technology. Another limitation worth mentioning is the fact that the study's findings relied solely on self-reported data. As Dörnyei and Taguchi (2010) note, it is a natural inclination for humans to portray themselves in a positive manner; it should be acknowledged that the participants in the study may have felt the urge to answer the questionnaire and interview questions that would be socially acceptable and slightly exaggerate the extent of their learning. Further, although the study's intent from the start was to understand what language teachers were doing to expand their knowledge and skills in technology for instructional purposes, it was unclear how they were actually applying what they learned from utilising varying materials and tools into their teaching instructions. It would be worthwhile for future studies to dive into this point further and examine the intricate relationship between teacher learning and its impact on their teaching practice.

Final remarks

The present study illustrated that language teachers are enhancing their knowledge and skills in technology for instructional purposes in a multitude of ways, with many taking advantage of various online affordances. Despite feeling the pressure to utilise technology in their classes, the participants did not have many opportunities to learn through formal means and often relied upon informal and self-directed learning methods which they discovered on their own. Although the present study focussed primarily on language teachers teaching in Japan, the findings remain relevant in other international contexts where teachers are similarly under pressure to use technology in their classes without adequate support to learn about its usage.

Integrating technology into one's classroom is not an easy task, though this point is often overlooked by institutional administrators, policymakers, and governmental bodies. As Zhao and Tella (2002) stress, "the ability to teach with technology is quite different from the ability to use it, because technology must be integrated with a sound pedagogical framework" (p. 1). Simply supplying teachers with technology will not guarantee their successful integration. As such, emphasis should be placed on carefully guiding teachers on how to effectively use technology to teach. Without sufficient professional knowledge and skills in technology for instructional purposes, teachers will not be able to use technology in their classes successfully, which may, ultimately, impede students' overall learning process.

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Appendix

Main initial questionnaire questions

- Please select your gender. Female/Male/Prefer not to say
- Please select your age group. 20–29/30–39/40–49/50–59/60–69/70+
- Please state your nationality.
- Please state your current place of residence (city and country).
- Which language do you mainly teach?
- What is your main teaching context?
- What is your current employment status?
- How long have you been teaching a second/foreign language?
- Do you use technology in your classes? Yes/No
  - How do you use technology in your classes? (If you changed the way you use technology due to the COVID-19 situation, please explain how you used technology before the COVID-19 situation. Please explain how you are using technology during the COVID-19 situation.)
- Has your technology use in your classes changed due to the COVID-19 pandemic?
  - For those who answered "yes" to the previous question, how has your technology use in your classes changed?
- Are you currently learning anything about how to use technology in language teaching and learning? Yes/No

- ► How often do you do the following activities to learn about how to use technology in language teaching and learning?

Activities (Rows):

1. Attend face-to-face (not online) academic conferences
2. Attend online conferences
3. Take face-to-face (not online) lectures/courses
4. Take online lectures/courses
5. Search the web
6. Watch videos
7. Read journals articles
8. Read books
9. Read blog posts
10. Read email list messages
11. Connect with teachers on Social Networking Sites (SNSs)
12. Ask coworkers
13. Observe other teachers' classrooms

Frequency (Columns)

1. Daily
2. 2–3 times a week
3. Once a week
4. Once a month
5. Twice a year
6. Once a year
7. Rarely
8. Never

- ► Do you wish to learn more about how to use technology in language teaching and learning in the future?
  - ▼ Those who answered "Yes" to the previous question: What would you specifically want to learn about?
  - ▼ Those who answered "No": Why do you not want to learn about it?

Main interview questions

Opening questions

- ► Could you briefly introduce yourself?
- ► What is your educational background?
- ► How long have you been teaching a language as a second/foreign language?

Technology use in class

- ► Do you use any technology in your language classes?
- ► How do you use technology in your language classes?
- ► Why do you use technology in your language classes?
- ► Has the COVID situation affected your teaching?
- ► How has it changed?

- What is your view towards using technology for language teaching purposes?

Learning about technology in language teaching and learning

- Are you currently doing anything to learn about how to use technology in language teaching and learning?
- What are you currently doing to learn about how to use technology in language teaching and learning?
- Why have you chosen such a method to learn?
- What motivates you to learn about how to use technology in language teaching and learning?
- Do you want to continue learning about how to use technology in the future? Why / Why not?
- Have you had any formal/informal training (e.g., at your institution, university) in using technology for language teaching and learning in the past?
- Why are you not learning about how to use technology in language teaching and learning?
- Do you want to learn about how to use technology in the future? Why/ Why not?

Main post-interview questionnaire questions

- As of 2022, are you teaching online? Yes/No
  - Those who answered "Yes" to the previous question: Why are you teaching online? Because of the pandemic/ Other
  - Those who answered "Because of the pandemic" to the previous question: Do you think you will use technology in class the same way as pre-pandemic times when online classes are no longer a requirement? Yes/No
  - Those who answered "No": Are you using technology in class the same way as pre-pandemic times since going back to face-to-face teaching? Yes/No
- Have you acquired any new skills and knowledge in using technology for teaching purposes since the COVID-19 pandemic (i.e., since February 2020)? If so, could you elaborate on your answer?
- How often have you been doing the following activities to learn about how to use technology in language teaching and learning over the past year (2021–2022)?