

# Language Teachers and Technology: Beliefs, Attitudes, and Knowledge

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**Abstract:** This study explores language teachers' beliefs, knowledge, and attitudes toward technology integration. Amidst the COVID-19 pandemic, language teachers were compelled to adopt various technologies for remote teaching. Our findings reveal a strong belief among teachers in the importance of technology skills for effective classroom implementation. While positive attitudes toward technology adoption were prevalent, opinions varied on its impact on teaching abilities. Teachers recognized the benefits of technology for communication and creating instructional materials. Yet, views on student engagement with technology were diverse. The findings emphasized the influence of teacher background and attitude in shaping their utilization of technology, with implications for teacher professional development and the integration of technology into educational practices.

## Introduction

The decisions that language instructors make regarding teaching are rooted in their beliefs, knowledge, and attitudes toward teaching gained through education, contextual factors, and classroom practices (Borg, 2003, 2015). Due to COVID-19, language teachers have been forced to use a variety of technology, in some cases familiar, but in many cases new. Additionally, teachers working in higher education had to rapidly switch from face-to-face courses to delivering classes online, both synchronously and asynchronously. This period, from 2020 to in some cases 2022, was known as emergency remote teaching (ERT), during which teachers tried “not to re-create a robust educational ecosystem but rather to provide temporary access to instruction and instructional supports in a manner that is quick to set up and is reliably available during an emergency or crisis” (Hodges et al., 2020, Emergency Remote Teaching section). This concurrent need for and exposure to technology offered an opportunity to investigate

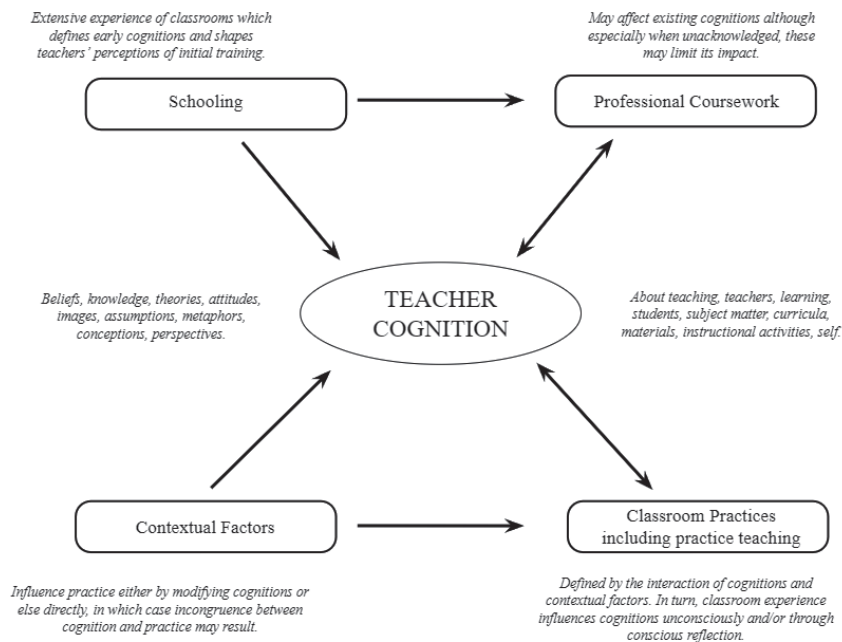
potential changes in teachers' beliefs, attitudes, and knowledge of technology implementation within their teaching context.

Research in language teacher cognition (LTC) has expanded widely over the past 20 years yet remains limited regarding technology use. Therefore, research to fill the gap in LTC and technology is warranted. Drawing on theories in LTC, the aim of this paper is to report findings on language teachers' beliefs, knowledge, and attitudes toward implementing technology within their teaching practice focusing on Japanese tertiary education.

### Language Teacher Cognition

Borg (2015) describes language teacher cognition as “what teachers think, know and believe – and of its relationship to teachers' classroom practices” (p. 1). Furthermore, teachers are active rather than passive decision-makers, which makes them an important resource for language learning in the classroom. Teachers' education, professional development, environmental conditions, and classroom procedures impact

Figure 1: Model of Teacher Cognition



(Borg, 2003)

their attitudes, knowledge, and views about teaching foreign languages. This is represented in Figure 1.

Pre-service, in-service, and specific curricular areas have received much attention in the literature on LTC (i.e., grammar, reading, and writing). With a focus on LTC studies conducted in Japan, there are several prominent studies (i.e., Cowie, 2011; Nishino, 2012; Yoshiyuki, 2011), as well as studies on teacher beliefs of technology integration (i.e., Chamorro & Rey, 2013; Gerez, 2019; Kim et al., 2013).

In an integrated study utilizing surveys, interviews, and classroom observations, Nishino (2012) examined the associations between Communicative Language Teaching (CLT) views, behaviors, and socio-educational characteristics among Japanese high school teachers. A Teacher Beliefs Questionnaire was created and distributed to 188 randomly selected Japanese high schools, with 139 teachers responding. Also included in the study were observations of 12 English classes taught by four Japanese high school instructors to determine the usage of communicative practice activities. Nishino (2012) discovered that the participants' learning experiences, in-service training, and contextual factors (such as university entrance exams) all influenced their beliefs and behaviors. Positive perceptions of CLT also had an indirect impact on teaching methods. Furthermore, teachers' learning experiences particularly affected their beliefs and practice of CLT in the classroom.

Kim and colleagues (2013) employed a mixed-method study to ascertain the relationship between teacher beliefs and technology integration practices. Specifically, Kim et al. (2013) were interested in the relationships between instructors' practices of technology integration, attitudes about the nature of knowledge and learning, and views about successful teaching methods. They uncovered that there are specific correlations between instructors' beliefs, their use of technology, and the consequences for professional development as well as strategies for changing teachers' perceptions of technology. Although this study focused on K-8 teachers in the United States, it is relevant since it is small-scale research involving twenty-two teachers and their conceptions of teaching and the use of technology in their contexts. Furthermore, they incorporated both surveys and interviews to obtain their data, a similar approach used in the current research paper's methodology.

In a Ph.D. dissertation, Gerez (2019) explored the beliefs, attitudes, and views of

middle school educators toward the practice of educational technology. Through a case study approach by means of surveys and interviews, three main trends emerged: the value of collaborative professional development, the level of student involvement, and teacher technology use motivation. These findings are helpful to those working to transform education, who can utilize the case study to help them comprehend the value of considering teachers' perceptions and the necessity of giving them a chance to pursue targeted professional growth (Gerez, 2019).

Applying language teacher cognition towards integrating technology among EFL teachers in Japan was a major objective of this project. Nevertheless, there is a gap in the literature regarding language teacher cognition in online contexts, and this study merges the themes and ideas above regarding language teacher cognition and technology integration.

The aim of this research project was to investigate language teachers' beliefs, knowledge, and attitudes toward implementing technology within their teaching practice. The following research questions guided this study:

- (1) What are teachers' beliefs, knowledge, and attitudes toward implementing technology?
- (2) How do teachers' beliefs and attitudes about technology affect their practice?

## **Method**

This study's guiding research questions were addressed using a mixed-methods approach, which combines quantitative and qualitative research. Quantitative research is helpful when working with numerical numbers and determining links between various values (Hudson, 2015). Comparatively speaking, "qualitative research is primarily concerned with representing in textual (sometimes visual) form an analysis of people's lived experiences in specific contexts as these are represented through their behavior and discourse" (Richards, 2015, p. 61). A mixed-method study allows for the analysis of data on several levels and improves the validity of the research (Dörnyei, 2007).

## ***Participants***

A questionnaire, based on and adapted from Gerez's (2019) Ph.D. dissertation, was sent to university language instructors. The demographics of the survey participants are

presented in Table 1. The survey participants were given the option to participate in the interview portion of the study, with a subsection of those who responded positively selected by the researchers based on demographic criteria. The demographics for the interview participants can be found in Table 2.

**Table 1**  
*Demographics of survey participants (n = 103)*

Gender		Teaching in	
Female	40	Chubu/Hokuriku	45
Male	62	Kanto	19
No response	1	Kansai	13
		Chugoku/Shikoku	4
		Kyushu/Okinawa	6
		Hokkaido	3
		Overseas	13
Nationality by Region		Age	
Non-Japanese Asian	4	20-29	2
European	27	30-39	15
Japanese	9	40-49	33
Latin American	3	50-59	30
North American	44	60+	23
Oceanian	14		
No response	2		

**Table 2**  
*Demographics of interview participants*

Gender		Region	
Female	6	Chubu	4
Male	6	Kansai	2
		Kanto	6
Nationality		Age	
Australian	3	30-39	3
American	2	40-49	4
British	4	50-59	3
Canadian	2	60+	2
Japanese	1		

## ***Procedures***

In this study, the researchers administered a 42-item questionnaire (see Appendix A). The questionnaire asked (1) biographical information, (2) understanding and views on technology use in language teaching, and (3) questions about technology use. For all Likert scale questions, the minimum possible response was 1 (Strongly Disagree) and the maximum was 4 (Strongly Agree). Items regarding educational software, learning management system (LMS) platforms, or application use were multiple response format questions. Follow-up interviews (see Appendix B), which survey participants could opt in to, were conducted individually between each participant and one of the researchers and were recorded for later analysis.

## ***Analysis***

As a first step in the quantitative analysis, descriptive statistics tests in IBM SPSS Statistics (28.0) were run for selected Likert-scale questionnaire items to understand means, standard deviations, skewness, and kurtosis. Questionnaire data were analyzed in SPSS. For interview data, MAXQDA 2022 was used to conduct word-frequency (keyword) analysis and code interview data. Seale & Charteris-Black (2010) recommend a keyword analysis for qualitative studies with multiple interviews so that researchers can gain an “aerial view of the landscape” before narrowing the focus to salient commonalities among the participants. After finding high frequency keywords among all the participants, one participant (Participant A) was randomly selected from among the interviewees for analysis in the current report. A further keyword search of their interview was conducted, followed by an extraction of key phrases and topics to gain a more in-depth understanding of their outlook.

## **Results**

### ***Quantitative Results: Questionnaire***

Quantitative results in this study were collected from the questionnaire and from a keyword analysis of the interview data. Table 3 presents descriptive statistics for how teachers felt about technology prior to April 2020 (COVID-19). The highest mean was 3.4 for the statement “Teachers should know how to use technology in class,” showing high average agreement. The lowest mean, showing low average agreement, was 1.67 for the statement “Technology intimidated and threatened me.” Of note, the statement

“Teachers should know how to use technology in class,” was the only item where the minimum response was 2 (Disagree). The greatest standard deviation was 0.88 for the statement “I would be a better teacher if I knew how to use technology properly,” showing a wide range of opinions. Skewness and kurtosis for this and the following responses were found to be within the acceptable range of  $\pm 2$  (Larson-Hall, 2016) indicating the responses were normally distributed.

**Table 3**

*Descriptive statistics for responses to “How did you feel about technology prior to April 2020 (COVID-19) when teaching in-person in a classroom?”*

	Mean	Std Dev	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
I enjoyed using technology.	3.27	0.76	-0.92	0.24	0.68	0.47
I avoided using technology when I could.	1.82	0.79	0.71	0.24	0.01	0.47
I thought technology could easily be used within the time constraints of a lesson.	2.99	0.72	-0.31	0.24	-0.14	0.47
I thought that technology could help me improve my teaching quality.	3.16	0.67	-0.59	0.24	0.89	0.47
Technology intimidated and threatened me.	1.67	0.76	0.78	0.24	-0.36	0.47
Teachers should know how to use technology in class.	3.40	0.62	-0.50	0.24	-0.61	0.47
I would be a better teacher if I knew how to use technology properly.	2.77	0.88	-0.24	0.24	-0.64	0.47
I was very confident when it came to working with technology in class.	2.89	0.79	-0.17	0.24	-0.62	0.47

Table 4 shows the responses to statements regarding risk taking and comfort with technology. The largest standard deviation of 0.88 was observed for the statement “I am confident with my ability to troubleshoot when problems arise while using technology.”

**Table 4**

*Descriptive statistics for Risk Taking and Comfort with Technology*

	Mean	Std Dev	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Learning new technologies is confusing for me.	2.02	0.85	0.35	0.24	-0.71	0.47

I get anxious when using new technologies because I don't know what to do if something goes wrong.	2.12	0.83	0.09	0.24	-0.92	0.47
I am confident with my ability to troubleshoot when problems arise while using technology.	2.82	0.88	-0.33	0.24	-0.59	0.47
I get anxious when using technology in front of my students.	2.04	0.78	0.19	0.24	-0.71	0.47
I get excited when I am able to show my students a new technology application or tool.	2.96	0.85	-0.51	0.24	-0.30	0.47
I am confident in trying to learn new technologies on my own.	3.04	0.82	-0.40	0.24	-0.58	0.47
I enjoy finding new ways that my students and I can use technology in the classroom.	2.98	0.82	-0.63	0.24	0.12	0.47
Learning new technologies that I can use in the classroom is important to me.	3.03	0.80	-0.53	0.24	-0.12	0.47

Descriptive statistics for responses to statements regarding perceived benefits of technology use are presented in Table 5. Participant responses to all statements for this question ranged from the minimum answer 1 (Strongly Disagree) to the maximum answer 4 (Strongly Agree) except for the statement “Using technology to communicate with others allows me to be more effective in my job,” for which the minimum response was 2 (Disagree), indicating relatively strong overall agreement with that statement. The highest mean score was observed for the statement “Computer technology allows me to create materials that enhance my teaching,” with a mean of 3.41, reflecting a number of strongly positive responses. The lowest mean score was 2.81 for the statement “My students get excited when they use technology in the learning process,” which indicates agreement with the statement (midpoint = 2.5), albeit not as strongly. The highest standard deviation was 0.77 for the same statement, reflecting the diversity of opinions among participants. All values for skewness and kurtosis were within the acceptable range.



**Table 5**  
*Descriptive statistics for Perceived Benefits of Technology Use*

	Mean	Std Dev	Skewness	Kurtosis		
	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Using technology to communicate with others allows me to be more effective in my job.	3.25	0.57	-0.05	0.24	-0.40	0.47
Computer technology allows me to create materials that enhance my teaching.	3.41	0.60	-0.74	0.24	1.10	0.47
Computer technologies help me be better organized.	3.15	0.72	-0.55	0.24	0.17	0.47
Technology can be an effective learning tool for students.	3.37	0.56	-0.49	0.24	1.42	0.47
My students get excited when they use technology in the learning process.	2.81	0.77	-0.31	0.24	-0.12	0.47

The next section of the survey asked participants to report on their LMS experience and knowledge. In Table 6, it can be seen that Google Classroom was the LMS that participants had experience using the most ( $n = 69$ ). Moodle, Microsoft Teams, and Blackboard also were popular LMS platforms that teachers expressed experience using and about which they felt knowledgeable. Please note that for this item, participants could respond with more than one answer.

**Table 6**  
*Questionnaire responses for “What LMS platforms do you have experience using?”*

Technology	Participants	Technology	Participants
Google Classroom	69	WebClass	9
Moodle	64	Web Campus	9
Microsoft Teams	54	Schoology	6
Blackboard	39	Passport	4
Manaba	31	D2L Brightspace	4
Canvas	24	in-house LMS	3
Edmodo	21		

\* platforms mentioned only once are not included

### **Quantitative Results: Keyword Search of Interviews**

This section presents the results of a high frequency keyword search from the semi-structured interviews. To find common points among the 12 interviews, the researchers did a keyword analysis to see which words were most frequently mentioned among

the participants. As can be seen in Table 7, 'technology' was the most mentioned keyword ( $n = 397$ ; 12 interviews). Most of the listed keywords were mentioned in all the interviews, but 'writing', 'paper' and 'software' appeared high on the list despite being mentioned by only about two-thirds of the participants. Keywords with 41 instances or less were not included on the table.

**Table 7**  
*High frequency keyword search across all participants*

Keyword	Instances in all interviews	Mentioned in interviews (max. 12)	Keyword	Instances in all interviews	Mentioned in interviews (max. 12)
technology	397	12	language	86	12
students	328	12	teachers	72	10
teaching	218	12	face	67	12
classroom	210	12	Zoom	67	12
online	180	12	help	46	11
time	159	12	video	46	12
Google	147	12	pandemic	45	11
English	124	12	talk	45	10
learning	124	12	improve	44	12
university	95	10	paper	44	7
writing	88	8	software	43	8

As L2 teachers were the focus of this research, L2 learning competencies were included as a point of interest. Investigating the frequency of L2 key competencies (reading, writing, listening, speaking, plus vocabulary) shows the attitudes and objectives of participants' technology use. As can be seen in Table 8, 'writing' ( $n = 88$ ; 8 interviews) and 'write' ( $n = 56$ ; 10 interviews) were the most commented key competencies. It should be noted that while 'write' was mentioned less frequently, it was talked about in more interviews. All key competencies were mentioned among the interviews, but less frequently than 'writing' (reading,  $n = 32$ ; speaking,  $n = 29$ ; listening,  $n = 20$ ).

**Table 8**  
*High frequency keyword search with L2 learning competencies*

Competency	Total instances in all interviews	Mentioned in interviews (max. 12)
writing	88	8
write	56	10
reading	32	9

read	17	8
speaking	29	10
speak	13	6
listening	20	5
listen	13	9
vocabulary	15	6

One participant (male, age 50-59, British, Kansai region; Participant A) was randomly selected from among the interviewees for in-depth coding and analysis. Qualitative results for participant A are described in the next section. A keyword search was carried out on Participant A's interview transcript to understand the most frequent topics discussed during the individual interview. The results are listed in Table 9. The first column shows the keywords, and the second column indicates keyword frequency mentioned in Participant A's interview. The third column reports the proportion of times the keyword was mentioned in Participant A's interview as compared to the other interviews, with column four showing the total number of times each keyword was mentioned among all interviews. For example, "14.0%" in row 1 (keyword: students) was reached by dividing column two by column four ( $46 / 328 = 14.0\%$ ). The percentage is useful as it shows the interest of Participant A related to that keyword. Finally, column five shows the number of times mentioned across the 12 interviews.

**Table 9**  
*High frequency keyword search on interview data for Participant A compared to all participants*

Keyword	Times said by A	% compared to all participants	Total instances in all interviews	Mentioned in interviews (max. 12)
students	46	14.0	328	12
technology	37	9.3	397	12
teaching	26	11.9	218	12
class	25	21.4	177	12
time	20	12.5	159	12
online	16	8.9	180	12
LMS	15	75.0	20	5
CALL	12	63.2	19	3
LINE	12	63.2	19	2
community	11	100	11	1
pandemic	11	24.4	45	11

### ***Qualitative Results: Participant A Interview***

During the interview, four major themes emerged: community in the classroom, community among professional teachers, concerns of privacy, and resourcefulness. These themes came from Participant A's responses to topics such as technology use in the classroom with clear objectives and their own relationship with learning about and utilizing technology. Participant A shared that many of their attitudes came from their educational background. Their MA program was founded in the traditions of the Peace Corps, which is an organization dedicated to bringing together volunteers in communities in-need to serve the local community. Participant A shared that this emphasis in their educational background on community and cooperation greatly impacted their language teaching, thus was integrated into the way they taught during ERT. Additionally, Participant A had thought positively about technology for many years prior to ERT, mentioning that technology had the potential to give all students in a classroom instant feedback where a single teacher could not, and that technology could expose students to many varieties of language inputs. Participant A's academic background, pedagogical approach, and long-held positive view of technology as a benefit to language learning impacted the four major themes.

The first major theme was the use of technology to 'build a community' in online classrooms. Due to their Peace Corps based MA program, Participant A said that community, interaction, and the sharing of ideas was a key component of their teaching approach and something they strive to do in any classroom. Trying to build a sense of community despite having no explicit online teaching background, Participant A said, "I think I've found one thing because of the pandemic; forums are an invaluable tool for building community within a classroom and classrooms don't work well if there's no community." Participant A was concerned about maintaining a positive classroom environment that facilitates communication among the students in an asynchronous environment. Participant A said that forums facilitated student interaction, giving opportunity for input and the creation of output. They went on to say "What I did with that for most classes was [to create a] situation in which students are required to [give] feedback to each other, within the LMS that was provided by the school" mentioning that this worked well for their classes.

The second major theme for Participant A was a 'community among professional teachers' where they could share ideas about technology. Participant A mentioned that

currently “I have my own office. There are certainly downsides to a common office, but [one upside is] that communication is useful.” This sentiment was doubled during COVID as they could not meet other educators on campus when all the classes were online. They mentioned this because they considered a common office to be a space to casually share ideas about new technologies that worked well or did not work well in the classroom. Moreover, without discussion about technology, people could become set in their ways of teaching. “A lot of teachers don’t know these (useful technology) unless someone sits down with them and shows them. So, you need to take these regular opportunities.” Participant A enjoyed learning about technology as they mentioned learning coding to better understand education platforms and constantly looking for new apps to try in class, so this lack of community was problematic for them.

‘Privacy concerns’ were also a major theme. Participant A wanted to make sure that the online environment for students was interactive, but also safe and secure. Participant A made sure to read user agreements and platform data management because “I think I’m looking a lot more carefully for how things could be used online in forums and the LMS platform or in the classroom.” Though they were willing to try different apps, a line was drawn if students needed to sign up for something with personal information. This concern greatly influenced their use and adaptation of technology, disregarding some websites or apps that were viewed as unreliable.

Finally, the fourth theme was ‘resourcefulness.’ The master’s program taken by Participant A encouraged students to take into consideration what resources teachers or students would have access to during lessons. In many cases, Peace Corps missions take place in developing nations, so school resources and supplies are limited. Participant A viewed technology as a solution to taking their own tests and books along everywhere:

So it (the program) was designed to make you resourceful in that way. At that time I developed my interest in technology and did a little bit of work on CALL (computer assisted language learning). At that time (early 2000s) I did a CALL course but we were even making quizzes on Excel that students could take, you know if we lost our internet connection which did happen sometimes [while on Peace Corps missions] you know we had a collection of quizzes on Excel which students could take.

During the interview, Participant A discussed the evolution of this belief as technology progressed and found that technology such as online quizzes were efficient for checking student understanding and reducing teacher workload (homework grading). Therefore, ERT was seen as an opportunity to try new online programs and quiz formats for Participant A rather than a burden. They adapted pre-ERT material to class during ERT and continued to use the material after the return to in-person teaching post-pandemic.

## Discussion

### ***RQ1: What are teachers' beliefs, knowledge, and attitudes toward implementing technology?***

The data clarified several points regarding the nature of teachers' beliefs, knowledge, and attitudes toward implementing technology. Descriptive statistics for responses concerning how teachers felt about technology prior to April 2020 (COVID-19), provided insights into teachers' beliefs, knowledge, and attitudes toward implementing technology. Regarding beliefs, the statement "Teachers should know how to use technology in class" received the highest mean of 3.4. This suggests that there is a general consensus among the respondents that teachers should possess technology skills for effective classroom implementation. As for knowledge, no respondents selected 1 (Strongly disagree) to the statement "Teachers should know how to use technology in class" suggesting that the consensus among respondents is that technology use in the classroom is an essential skill for teachers. Considering attitudes, the lowest mean of 1.67 was observed for the statement "Technology intimidated and threatened me." This suggests that many teachers did not feel intimidated or threatened by technology before April 2020, perhaps reflecting a longstanding positive attitude toward implementing technology in the classroom. It should be noted that the statement "I would be a better teacher if I knew how to use technology properly" had the greatest standard deviation of 0.88. This indicates that there was a wide range of opinions among respondents regarding the impact of technology on their teaching abilities. Some teachers might believe that technology would enhance their effectiveness as educators, while others may hold a different perspective. Overall, descriptive statistics for responses to the question "How did you feel about technology prior to April 2020 (COVID-19) when teaching in-person in a classroom?" suggests that, on average,

teachers had a positive belief in the importance of technology knowledge for teaching. However, individual attitudes varied, with some teachers feeling less intimidated or threatened by technology than others. The wide range of opinions regarding the impact of technology on teaching effectiveness indicates a diversity of attitudes among the respondents.

Descriptive statistics for responses to statements regarding perceived benefits of technology use also provided diverse insights. The participants' responses indicated that they generally recognized and acknowledged the benefits of technology use in teaching. The highest mean score of 3.41 for the statement "Computer technology allows me to create materials that enhance my teaching" suggests that teachers believed technology enabled them to create instructional materials that enhance their teaching effectiveness. The participants expressed relatively strong overall agreement with the statement "Using technology to communicate with others allows me to be more effective in my job." This conveys that teachers believed technology facilitated effective communication, which aligns with the perceived benefits of technology use. The statement "My students get excited when they use technology in the learning process" received a mean score of 2.81, indicating agreement but not as strongly as with other statements. It can be seen from this statement that teachers recognized the potential for technology to excite students, but opinions were more varied in this regard. The largest standard deviation of 0.77 for the statement about student excitement with technology reflects a diversity of opinions among the participants. This indicates that teachers' attitudes and beliefs regarding student engagement through technology were not uniform and varied across individuals. All values for skewness and kurtosis were within an acceptable range, indicating that the responses to the statements were relatively normally distributed. This implies that teachers' beliefs, knowledge, and attitudes toward implementing technology were not significantly skewed or heavily concentrated towards extreme viewpoints. Overall, descriptive statistics for responses to statements regarding perceived benefits of technology use indicate that participants generally perceived benefits in using technology for communication and creating teaching materials. However, opinions were more mixed regarding the excitement of students when using technology in the learning process.

Regarding technology use, Google Classroom (69), Moodle (64), and Microsoft Teams (54) were reported as the primary platforms used by teachers during ERT

(Table 6). While other platforms created specifically in Japan were used such as Manaba (34), WebClass (9), and Web Campus (9), it was noteworthy that the more popular, free platforms were used more often. In many cases, Japanese institutions contract with companies for access to platforms such as Manaba or Webclass for in-house LMS websites, but despite this it seems free platforms were preferred. There could be several reasons for this. One reason is that free platforms can be used at multiple institutions if the instructor teaches at additional universities. The survey participants indicated that approximately half ( $n = 45$ ) taught at only one institution, but more than half ( $n = 58$ ) taught at two or more institutions. It may have been easier and less time consuming to get used to one platform and use it everywhere rather than learning each official school platform. Another reason could have been the easy-to-use, intuitive nature of platforms like Google Classroom, Moodle, and Microsoft Teams. Japanese platforms such as Manaba are designed primarily for Japanese users, with a function that translates internal website commands to English but is not user friendly. Given that most participants in this research were non-Japanese teachers, language and user-friendliness could be other reasons for less use of the Japan based institutional platforms.

From the quantitative keyword analysis of the interview data (Table 7), teachers' attitudes and beliefs were on display. The most frequently mentioned keywords were technology (397 instances), students (328 instances), teaching (218 instances) and classroom (210 instances) discussed in all 12 of the interviews. These words were to be expected given the topic of online teaching during ERT. The 6th keyword, 'time' (159 instances) was a new topic, requiring more attention. Some combinations that occurred with 'time' were 'time with administration', 'time writing', 'change over time', 'time to talk', 'real time', and 'time to plan' indicating that a diverse array of topics were covered with this single word. Especially during ERT, time consuming assignment creation and checking for teachers were thought to be common topics, but time came up in other instances as well. This topic will be discussed in a future paper.

'Google' (147 instances) and 'Zoom' (67 instances) were the only two specific platforms that appeared in the high frequency keyword search (Table 7). 'Google' was expected as 'Google Classroom' ( $n = 69$ ) was the highest rated platform in the survey that teachers had experience with (Table 5), but other similarly ranked platforms such as 'Moodle' ( $n = 64$ ) and 'Microsoft Teams' ( $n = 54$ ) did not appear in Table 7. One possibility is that the randomly selected interviewees were not familiar with these



other platforms. But another possibility is that the use of Google was quite pervasive among teachers at Japanese universities. 'Zoom' was lower ranked than 'Google', but this could have been due to synchronous classes being less frequent than asynchronous classes.

From the qualitative portion of the study, it was clear that teacher background and view of technology prior to ERT impacted their implementation of technology. Participant A had a positive view of technology prior to ERT and felt very comfortable that they could easily adapt to an online environment. They thought that technology was a useful educational tool and had made use of it in the past, so though they knew they would have to work hard to figure out how to make online classes during ERT, it was viewed as an opportunity rather than an impossibility.

Two of Participant A's major themes of 'community in the classroom' and 'concerns of privacy' also impacted their technology use in the classroom. Though open to new technology and interested in facilitating communication in the classroom, Participant A tended to relegate this to their school's LMS because they were concerned about third-party websites and apps stealing student information. Also, the sharing of student faces was not restricted, but also not encouraged because they wanted to keep student participation at a comfortable level without compromising security concerns. These concerns affected their technology use, and it is likely that other teachers' relationships to technology prior to COVID also greatly impacted how they approached technology use during ERT.

***RQ2: How do teachers' beliefs and attitudes about technology affect their practice?***

Based on the descriptive statistics for responses to the question "How did you feel about technology prior to April 2020 (COVID-19) when teaching in-person in a classroom?", there were several emerging trends regarding teachers' beliefs and attitudes about technology affecting their practice. The highest mean being for the statement "Teachers should know how to use technology in class" suggests that there is a high level of agreement among teachers that technology skills are important for effective teaching. This could indicate that teachers who hold this belief are more likely to incorporate technology into their instructional practices. On the other hand, the lowest mean for the statement "Technology intimidated and threatened me" implies that, on average, teachers did not feel intimidated or threatened by technology. This

suggests that teachers' attitudes towards technology may not be a significant barrier to its integration into their teaching practice. The statement about the wide range of opinions (high standard deviation) regarding being a better teacher with proper technology knowledge implies that some teachers may see technology as a valuable tool for improving their teaching, while others may have more reservations or different perspectives on its impact. Overall, descriptive statistics for responses to the question "How did you feel about technology prior to April 2020 (COVID-19) when teaching in-person in a classroom?", suggest that there is a generally positive attitude towards technology among teachers, with a recognition of its importance for effective teaching. However, it is expected that individual differences in beliefs and attitudes will influence how teachers incorporate technology into their instructional practices.

Descriptive statistics for responses to statements regarding perceived benefits of technology use provide insights into teachers' beliefs and attitudes about technology and how they may affect their practice indirectly. Regarding perceived benefits, the descriptive statistics presented in Table 5 indicate that teachers generally perceive benefits in using technology in their teaching practice. For example, the statement "Computer technology allows me to create materials that enhance my teaching" received the highest mean score, suggesting that teachers strongly believe technology enables them to enhance their instructional materials. It can be inferred that this positive belief may influence teachers' practice by encouraging them to incorporate technology into their teaching methods. As for student engagement, it is worthy of note that the statement "My students get excited when they use technology in the learning process" received a lower mean score compared to other statements, as well as the highest standard deviation. This variability suggests that teachers' beliefs and attitudes about technology and its impact on student engagement can vary significantly. These differing viewpoints may influence how individual teachers choose to integrate technology into their instructional practices. While these descriptive statistics do not provide information on the direct relationship between teachers' beliefs and attitudes about technology and their practice, they do offer insights into teachers' perceptions and views about technology's benefits. These beliefs and attitudes can influence their decisions on incorporating technology into their teaching methods and the extent to which they leverage its potential in enhancing student engagement and instructional materials.

Through analysis of the qualitative data, it was clear that Participant A's beliefs and attitude impacted their practice during the pandemic. As a result of their Peace Corps-centered education, Participant A saw technology in two ways: 1) efficient and resourceful, and 2) community facilitating. As participant A had a positive attitude toward technology both as a benefit to students pre-ERT and to be efficient as a teacher (versatile lessons anywhere; efficient grading), using the transition to teaching online was considered an opportunity to expand their knowledge of technology rather than a burden. Moreover, community building and creating a classroom environment where students knew each other and felt comfortable was a primary belief of Participant A's pre-ERT, so they looked for a way to facilitate this in online classes. Participant A settled on forums on their university's LMS as a means of communication. This can also be seen in the quantitative analysis of their interview where Participant A mentioned 'LMS' 15 times, and 'community' 11 times. Interestingly, this shows the uniqueness of their outlook and the strength of their beliefs as 'LMS' was mentioned 75% of the time in Participant A's interview among all the participants, and 'community' was mentioned 100% of the time in Participant A's interview among all the participants; this indicates these topics were unique to Participant A during the interview. Therefore, it can be said that beliefs and attitudes do impact teacher behavior in the online classroom.

## **Conclusion**

Finally, our findings reveal that language instructors especially at Japanese universities generally hold a strong belief in the importance of possessing technology skills for effective classroom implementation. There was a consensus among respondents regarding the essentiality of technology use in the classroom, as no participants expressed strong disagreement when prompted on this point. Moreover, our study indicates a longstanding positive attitude among many teachers towards technology adoption in education, as evidenced by their minimal feelings of intimidation or threat from technology prior to April 2020. However, it is worth noting that there exists a wide range of opinions among teachers regarding the impact of technology on their teaching abilities, as indicated by the highest standard deviation observed for the related prompt in the questionnaire. This implies a diversity of perspectives among educators, with some perceiving technology as a valuable tool for improving their instructional practices, while others may have reservations or hold differing views on

its efficacy. Nonetheless, our research highlights teachers' positive beliefs in the importance of technology knowledge for teaching. Although individual attitudes vary, this collective recognition of technology's benefits is evident through their strong endorsement of statements such as "Computer technology allows me to create materials that enhance my teaching." The participants also expressed relatively strong agreement with the statement that technology facilitates effective communication, underscoring its role in enhancing their professional efficacy. In terms of student engagement, while teachers generally acknowledge the potential of technology to excite students, opinions varied on this matter. This variability is reflected in the mean score and highest standard deviation obtained for the statement "My students get excited when they use technology in the learning process." Such divergent viewpoints among instructors suggest that the extent to which technology engages students differs across individuals. Furthermore, our study demonstrates that teachers' beliefs, knowledge, and attitudes towards implementing technology in the classroom were relatively normally distributed. This implies that their perceptions were not significantly skewed or heavily concentrated towards extreme viewpoints. These insights provide a foundation for understanding teachers' perspectives on technology and how these perspectives indirectly influence their instructional practices.

In summary, the findings in this study contribute to the understanding of teachers' beliefs and attitudes regarding technology in language education. While teachers generally recognize the benefits of technology use for communication and creating instructional materials, opinions are more mixed concerning the excitement of students when using technology in the learning process. Nevertheless, the participants in the study were predominantly non-Japanese, thus there is a need to examine the beliefs and attitudes of Japanese English teachers to obtain a more complete picture of teachers' beliefs regarding technology integration in the EFL setting in Japan. Our study also underscores the influence of teacher background and attitude in shaping their utilization of technology. These findings hold implications for teacher professional development and the integration of technology into educational practices.

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**Appendix A: Teacher Beliefs, Attitudes, and Knowledge towards Technology Integration Survey**

**I. Biographical Information, and Education Background**

Which best describes you?

- female       male       other

How old are you?

- 20-29                       30-39                       40-49  
 50-59                       60+

What is your nationality?

- Japanese                       American                       Australian  
 British                       Canadian                       Other \_\_\_\_\_

What language(s) do you teach?

- English                       Chinese                       French  
 German                       Korean                       Spanish  
 Other \_\_\_\_\_

What degree(s) do you hold (check all that apply)? Please specify the field of study for each degree.

- Bachelor degree \_\_\_\_\_  
 Masters degree \_\_\_\_\_  
 Doctoral degree \_\_\_\_\_  
 Other: \_\_\_\_\_

Do you have any other teaching qualifications/certificates? If yes, please specify.

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Are you currently enrolled in any postgraduate education programs? Please specify the type of program (i.e. PhD; Masters; Postgraduate Certificate) and the field of study.

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Have you enrolled as a student in a course/workshop in which technology in education was a topic?

- Yes, I have completed a full course on technology in education.  
 Yes, I have completed a course in which technology in education was a topic.  
 Yes, I have completed a workshop on technology in education.  
 No, I have attended no courses or workshops.

Additional comments

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## II. Employment Background

What is your employment status?

- Full-time [Tenure]       Full-time [Contract]       Part-time

Are you currently a course liaison or program director?

- Yes       No

How many post-secondary institutions do you work at?

- 1       2-3       4-5       6+

How many post-secondary classes do you teach per week?

- 1-5       6-8       9-12       13-15       16+

Please check the focus of your classes. Check all that apply.

- Listening       Reading       Writing       Speaking  
 Proficiency test prep course       Content-based       Other \_\_\_\_\_

How long have you been teaching at the university level?

- This is my first year       1-5 years       6-10 years  
 11-20 years       20+ years

What percent of your Second Term 2021 classes are entirely online?

- 0%       1-33%       34-66%       66-99%       100%

Comments (If you have any additional comments about your online teaching in 2021, please write here.)

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In what region(s) do you teach? (Check all that apply)

- Hokkaido/Tohoku       Kanto       Chubu       Kansai  
 Chugoku/Shikoku       Kyushu/Okinawa

### III. Involvement with technology

Prior to April 2020, what types of devices did you own (or have exclusive use of through your institution)? (Check all that apply)

- desktop computer       laptop computer       tablet       smartphone  
 digital camera       MP3 player       digital video recorder  
 IC recorder       cell phone (not smartphone)

**How did you feel about technology prior to April 2020 (COVID-19) when teaching in-person in a classroom?** Mark ①*strongly disagree* - ②*disagree* - ③*agree* - ④*strongly agree*

I enjoyed using technology.	①	②	③	④
I avoided using technology when I could.	①	②	③	④
I thought technology could easily be used within the time constraints of a lesson.	①	②	③	④
I thought that technology could help me improve my teaching quality.	①	②	③	④
Technology intimidated and threatened me.	①	②	③	④



Teachers should know how to use technology in class.	①	②	③	④
I would be a better teacher if I knew how to use technology properly.	①	②	③	④
I was very confident when it came to working with technology in class.	①	②	③	④

Prior to COVID-19, how would you describe your online teaching competence?

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What do you find the most difficult about online teaching?

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What LMS platforms do you have experience using?

- Blackboard       Canvas       D2L Brightspace       Edmodo  
 Google Classroom       Moodle       Sakai       Schoology  
 Microsoft Teams       Manaba       Web Campus       Passport  
 Other \_\_\_\_\_

What types of devices do you currently own (or have exclusive use of through your institution)?

- desktop computer       laptop computer       tablet       smartphone  
 digital camera       MP3 player       digital video recorder  
 IC recorder       cell phone (not smartphone)

I wish I had more training with my institution(s) LMS.

Mark ①*strongly disagree* - ②*disagree* - ③*agree* - ④*strongly agree*

What kind of training do you wish you had?

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Additional comments

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#### IV. Technology Knowledge

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I know of this BUT I am not familiar using it -- ④I know of this AND I can use it.				
<b>Learning Management Systems</b>				
Blackboard	①	②	③	④
Canvas	①	②	③	④
Edmodo	①	②	③	④
Moodle	①	②	③	④
Google Classroom	①	②	③	④
Sakai	①	②	③	④
Schoology	①	②	③	④
Teams	①	②	③	④
D2L Bright Space	①	②	③	④
Manaba	①	②	③	④
Web Campus	①	②	③	④
Passport	①	②	③	④

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I know of this BUT I am not familiar using it -- ④I know of this AND I can use it.				
<b>Internet Phone Tools and Services</b>				
FaceTime	①	②	③	④
Line	①	②	③	④
Skype	①	②	③	④
Viber	①	②	③	④
WeChat	①	②	③	④
WhatsApp	①	②	③	④

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I know of this BUT I am not familiar using it -- ④I know of this AND I can use it.				
<b>Video Conferencing/Virtual Classroom</b>				
Adobe Connect	①	②	③	④
Blackboard Collaborate	①	②	③	④
Google Meet	①	②	③	④
WebEx	①	②	③	④
Zoom	①	②	③	④
Microsoft Teams	①	②	③	④

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I know of this BUT I am not familiar using it -- ④I know of this AND I can use it.				
<b>Video Editing and Commentary</b>				
Animoto	①	②	③	④
Premiere Pro (Adobe)	①	②	③	④
Final Cut Pro (Apple)	①	②	③	④
iMovie (Apple)	①	②	③	④
Movavi Video Editor	①	②	③	④
Nero Video	①	②	③	④

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I know of this BUT I am not familiar using it -- ④I know of this AND I can use it.				
<b>Other Tools for learning</b>				
Kahoot	①	②	③	④
Mentimeter	①	②	③	④
Poll Everywhere	①	②	③	④
Quizlet	①	②	③	④
Socrative	①	②	③	④
Augmented Reality and Interactive Storytelling (ARIS)	①	②	③	④

FlipGrid	①	②	③	④
Hello Talk	①	②	③	④
Minecraft	①	②	③	④
Second Life	①	②	③	④

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I know of this BUT I am not familiar using it -- ④I know of this AND I can use it.				
<b>Referencing Tools</b>				
Zotero	①	②	③	④
Mendeley	①	②	③	④
EndNote	①	②	③	④
RefWorks	①	②	③	④

How much do you know about the following technology? ①I don't know of this -- ②Maybe I have heard of it -- ③I am familiar with this -- ④I am very familiar with this				
<b>MOOCs (Massive Open Online Courses)</b>				
Coursera	①	②	③	④
ED-X	①	②	③	④
Future Learn	①	②	③	④
Udemy.com	①	②	③	④

If you have any additional comments about your knowledge of technology, please write here.

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<b>Risk Taking and Comfort with Technology</b> ①strongly disagree -- ② disagree -- ③ agree-- ④ strongly agree				
I feel comfortable about my ability to work with computer technologies.	①	②	③	④

Learning new technologies is confusing for me.	①	②	③	④
I get anxious when using new technologies because I don't know what to do if something goes wrong.	①	②	③	④
I am confident with my ability to troubleshoot when problems arise while using technology.	①	②	③	④
I get anxious when using technology in front of my students.	①	②	③	④
I get excited when I am able to show my students a new technology application or tool.	①	②	③	④
I am confident in trying to learn new technologies on my own.	①	②	③	④
I enjoy finding new ways that my students and I can use technology in the classroom.	①	②	③	④
Learning new technologies that I can use in the classroom is important to me.	①	②	③	④

<b>Perceived Benefits of Technology Use</b>				
①strongly disagree -- ② disagree -- ③ agree-- ④ strongly agree				
Using technology to communicate with others allows me to be more effective in my job.	①	②	③	④
Computer technology allows me to create materials that enhance my teaching.	①	②	③	④
Computer technologies help me be better organized.	①	②	③	④
Technology can be an effective learning tool for students.	①	②	③	④
My students get excited when they use technology in the learning process.	①	②	③	④

<b>Beliefs and Behaviors about Classroom Technology Use</b>				
①strongly disagree -- ② disagree -- ③ agree-- ④ strongly agree				
Providing students resources on how to use technology is part of my job.	①	②	③	④
Using technology in the classroom is a priority for me.	①	②	③	④
When planning instruction, I think about how technology could be used to enhance student learning.	①	②	③	④
I regularly plan learning activities/lessons in which students use technology.	①	②	③	④

I try to model effective technology use for my students.	①	②	③	④
I'm encouraged to integrate technology into the classroom.	①	②	③	④
Technology support is available in my school(s) to assist with troubleshooting.	①	②	③	④

<b>Teacher Administrative and Instructional Use</b>	<b>Yes</b>	<b>No</b>
Do you use a computer to create instructional handouts or assessments for students?	①	②
Do you use the Internet to gather information for lesson planning?	①	②
Do you create electronic templates to guide student computer use?	①	②
Do you use a computer to prepare or maintain classroom records?	①	②
Do you use a tablet to organize information?	①	②
Do you use spreadsheets (or grading programs) to maintain gradebooks and/or attendance?	①	②
Do you use e-mail to communicate with colleagues and/or administrators?	①	②
Do you post class information on an electronic bulletin board, website, or LMS (when teaching in-person in the classroom)?	①	②
Do you use technology to present information to students?	①	②
Do you demonstrate computer applications?	①	②
Do you demonstrate tablet/smartphone applications?	①	②
Do you provide/create learning centers?	①	②
Do you use technology to adapt an activity to students' individual needs?	①	②

<b>Instructing Students to Use Technology</b>	<b>Yes</b>	<b>No</b>
Do you have students work on the computer?	①	②
Do you have students use the Internet to research topics and gather information?	①	②
Do you have students use spreadsheets to organize and analyze data, and/or create graphs or charts?	①	②
Do you have students use Word/Pages/Google Docs (or equivalent) for writing assignments?	①	②

Do you have students use presentation software to present information?	①	②
Do you have students use technology to produce pictures/artwork?	①	②
Do you have students use technology to produce paper-based products such as newsletters or brochures?	①	②
Inz	①	②
Do you have students use technology to produce websites?	①	②
Do you have students use technology to solve problems?	①	②
Do you have students use a handheld device to gather and/or organize data, create concepts maps, write, or solve problems?	①	②

If you have any additional comments about your technology usage, please write here.

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I want to continue teaching languages online.

①strongly disagree -- ② disagree -- ③ agree-- ④ strongly agree

After returning to the classroom (post COVID-19), do you plan to continue using technology that you did not use before April 2020 (COVID-19)?

Yes --> After returning to the classroom (post COVID-19), what kind of technology do you plan to continue using?

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No --> Why don't you plan to continue using technology after returning to the classroom (Post COVID-19)?

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Are you willing to participate in a follow-up interview?

Yes

No

## Appendix B: Interview Questions & Protocol

Interview Place _____	Interview Date _____
Time started _____	Time ended _____

### I. Biographical Information

<b>Name</b> _____	<b>Gender</b> <input type="checkbox"/> female <input type="checkbox"/> male <input type="checkbox"/> other
What is your nationality? <input type="checkbox"/> Japanese <input type="checkbox"/> American <input type="checkbox"/> Australian <input type="checkbox"/> British <input type="checkbox"/> Canadian <input type="checkbox"/> Other _____	
<b>Age</b> <input type="checkbox"/> 20-29 <input type="checkbox"/> 30-39 <input type="checkbox"/> 40-49 <input type="checkbox"/> 50-59 <input type="checkbox"/> 60+	
What language(s) do you teach? <input type="checkbox"/> English <input type="checkbox"/> Chinese <input type="checkbox"/> French <input type="checkbox"/> German <input type="checkbox"/> Korean <input type="checkbox"/> Spanish <input type="checkbox"/> Other _____	
How long have you been teaching English as a Foreign/Second Language? <input type="checkbox"/> less than 5 years <input type="checkbox"/> 5-10 years <input type="checkbox"/> 11-15 years <input type="checkbox"/> 15-20 years <input type="checkbox"/> over 20 years	
What degree(s) do you hold and the field of study for each degree? <input type="checkbox"/> Bachelor of Arts/Science _____ <input type="checkbox"/> Masters of Arts/Science/Education _____ <input type="checkbox"/> Doctor of Philosophy/Education _____ <input type="checkbox"/> Other: _____	
Do you have any other teaching qualifications? <input type="checkbox"/> YES _____ <input type="checkbox"/> NO	
Have you enrolled as a student in a course/workshop in which technology in education was a topic? <input type="checkbox"/> Yes, I have completed a full course on technology in education. <input type="checkbox"/> Yes, I have completed a course in which technology in education was a topic. <input type="checkbox"/> Yes, I have completed a workshop on technology in education. <input type="checkbox"/> No, I have attended no courses or workshops.	



What is your employment status?

- Full-time [Tenure]       Full-time [Contract]       Part-time

How many post-secondary institutions do you work at?

- 1       2-3       4-5       6+

How many post-secondary classes do you teach per week?

- 1-5       6-8       9-12       13-15       16+

In what region(s) do you teach? (Check all that apply)

- Hokkaido/Tohoku    Kanto       Chubu       Kansai  
 Chugoku/Shikoku    Kyushu/Okinawa