Digital transformation in foreign language education: Examining the position of the EFL teacher in ICT literacy diffusion

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Abstract

Digital transformation and ICT adoption in Japanese higher education has lagged behind other developed countries. Drawing on Diffusion of Innovation theory, this preliminary case study examines the role of English foreign language (EFL) teachers as opinion leaders in information communication technology (ICT) literacy diffusion in the Japanese university context. The preliminary findings indicate EFL teachers enhance ICT literacy in breadth and depth for both teachers and students. With these findings this study proposes a tentative conceptual model that adds to the current scholarship on ICT utilization in Japanese higher education by illuminating how teachers can support digital transformation to expand the breadth and depth of ICT literacy, and cross-cultural diffusion of technology. Policy and pedagogical implications for in-service teacher professional development are discussed.

1. Introduction

Digital transformation is changing the landscape of education. Defined as “a process that aims to improve an entity by triggering significant changes to its properties through combinations of information, computing, communication, and connectivity technologies” (Vial, 2019, p. 121), digital transformation affects classrooms globally...
and how teachers reach their students. Within higher education (HE), digital transformation is change associated with the application of information communication technologies (ICT) in teaching (e.g., innovating pedagogical methodologies, digital literacy), infrastructure (e.g., digital platforms, connectivity), curriculum (e.g., new ways of learning, digital learning), administration (e.g., improving efficiency) (Benedises et al., 2020). “ICT literacy”, “digital competence”, or “digital skills” are terms often used interchangeably to refer to the skills needed to handle this transformation (Siddiq et al., 2016; Voogt & Roblin, 2012). This paper will use the term ICT literacy to refer to the skills needed for problem solving in technology-rich environments and effective and responsible ICT use in education. Recognition of the importance of ICT literacy and digitalization of HE institutions are growing with both international and national policies aimed at developing ICT skills globally (MEXT, 2011, 2012, 2020a, 2020b; OECD, 2022; UNESCO, 2022).

The Covid-19 pandemic compelled educational systems globally to rapidly digitalize their programs in response to the need to provide physically distanced education. Concerned by the inequality caused by the digital divide, such as exclusion from poor internet connections and a lack of devices, many countries, including Japan, responded immediately with policies to provide improve accessibility and connectivity (BEREC, 2021; MEXT, 2020a, 2020b; Reynolds et al., 2022). However, despite the enhanced digital infrastructure and environment following the improvements gained during the pandemic a lack of ICT skills continues to be one of the key barriers keeping from people fully benefiting from the benefits of technology in education (OECD, 2022).

This article draws on student and teacher data collected from one university in Japan to examine the position of the English as a foreign language (EFL) teacher in ICT literacy diffusion in the Japan HE context. The Diffusion of Innovations (DoI) theory (Rogers, 2010) is applied as a conceptual model to understand the role of the EFL teacher in ICT literacy diffusion. To contextualize this study an overview of Japan’s policy context, ICT literacy conceptualized as innovation, and the position of teachers as opinion leaders are first presented in the following sections.

Figure 1. Teacher preparedness for ICT-based teaching prior to the Covid-19 crisis. Note. Only the countries and economies with available data are shown. The OECD average refers to the average of OECD countries participating in TALIS 2018 (OECD, 2020, p. 1).


1.1 Digital transformation and ICT literacy in education in Japan

Even though Japan has been a leading innovative force in electronics since the 1980s, in education it has been slow to digitally transform and utilize ICT compared to other developed countries. In 2011, Japan’s Ministry of Education, Culture, Sports, Science & Technology (MEXT) outlined the government’s vision for ICT use in education with the objective that “ICT utilization in education should be promoted, with teachers fulfilling their duties and utilizing ICT in a manner that makes the most of its features” (MEXT, 2011, p. 6). One of the three key aspects of their operational goals was the “utilization of ICT in course instruction (realizing easy-to-understand classes that deepen children’s understanding through the effective use of ICT)” (MEXT, 2011, p. 6). Yet, in 2020 the Organization for Economic Co-operation and Development (OECD) published a country report on Japan’s teacher preparedness for ICT-based teaching and found that compared to other OECD countries, although teachers received formal ICT training, teachers rarely had students use ICT in their classes, teachers felt that they could not support student learning through digital technology and received very little professional development for ICT skills (Figure 1). Moreover, teachers in Japan reported the highest need for professional development in ICT skills out of all the OECD countries participating in the survey.

The Covid-19 pandemic brought to light the digital divide in ICT in education in Japan. For one month in spring 2020 most schools at the primary, secondary, and tertiary levels in Japan temporarily stopped face-to-face teaching and shifted to distance learning. However, in April 2020 a MEXT report on the homeschooling policy of public schools during the temporary closures indicated that all schools continued to use paper textbooks and paper teaching materials, 29% percent used some digital materials, and only 5% used live synchronous interactive online courses (Kang, 2021; MEXT, 2020d). As such, traditional learning methods were maintained, and students were not able to connect with other students through the educational system. Higher education in Japan however developed more with 90% of classes moving online and students learning conducted remotely (Kang, 2021; MEXT, 2020c). However, online teaching consisted of many methods, from recording online lectures and posting the video for students to watch on demand, to live streaming a teacher lecturing to students watching at home, to having students use different online spaces to engage with each other and the content collaboratively synchronously and asynchronously (Tsuji et al., 2023). There are some studies that suggest that many lecture classes at universities did not fundamentally change their teaching methods, but opted to live stream the common knowledge transmission style of teacher-fronted lectures (Keio University, 2020a, 2020b; Nae, 2020; Tsuji et al., 2023). This could be due to the pedagogical challenges of teaching large classes, but also could be due to the entrenched methods of teaching, learning and communicating in Japanese university lectures (Aoki, 2010; Funamori, 2017; Nae, 2020). However, despite the challenges of using ICT in higher education there is a strong indication that many are interested in maintaining the residual ICT literacy gains compelled by the pandemic (Kakuchi, 2022; Kang, 2021; Tejero, 2022)

1.2 ICT literacy as an innovation

This study takes the position that although technology in education is ubiquitous, ICT literacy is still an innovation for many. Innovation is “an idea, practice or object that is perceived as new by an individual or other unit of adoption” (Rogers, 2010, p. 35). There are so many applications of technology that digital literacy is more complex than simply “can a teacher use a computer?” (Iordache et al., 2017; Jansen et al., 2013). Japan has made huge investments in ICT infrastructure and hardware accessibility compared to many OECD countries (International Trade Administration, 2021; JETRO, 2021; MEXT, 2020b), however ICT integration in most higher education classes is still limited. While addressing hardware accessibility and infrastructure connectivity issues (e.g., devices for every student, Wi-Fi connections, etc.) is undoubtedly an important first step for ability to use ICT, it does not resolve the key issue with ICT literacy in education—and that is how individuals engage with technology so that they can use them effectively. Indeed, some studies have found negative effects associated with devices. For instance, there are concerns about distractions built into technology so that they can use them effectively. Indeed, some studies have found negative effects associated with devices. For instance, there are concerns about distractions built into software programs that can affect learning (Buckingham, 2013), also it can cause students to interact differently with new concepts (passive typing on a keyboard vs conceptualizing and summarizing by pen) that may affect understanding (Mueller & Oppenheimer, 2014). Thus, ICT integration is not solved simply by providing an ICT enabled environment.

ICT literacy is innovation because it is more than simply replacing tasks—it requires the teacher and students to do tasks differently, overcome social, psychological, and environmental barriers, and take on new roles. First, when developing a course using technology, teachers are not only teaching the material in the same way, they must consider how the technology works, the limitations of that technology, and how to introduce it to students (Nikolić et al., 2019). As such, they require technological knowledge that is both independent from, and works interdependently with, their course content and pedagogical knowledge
Lack of ICT competence can be a barrier to ICT integration (Luppicini, 2007; Rienties et al., 2012). Barriers for ICT adoption can be classified as extrinsic and intrinsic (Bingimlas, 2009; Ertmer, 1999). Extrinsic factors are those that are external to the individual (e.g., the environment, infrastructure, technical support, social teaching community). Intrinsic factors refer to psychological and cognitive capabilities of the individual (e.g., confidence, beliefs, knowledge, etc.). The scholarship is clear that even with an environment that provides technology hardware and network capabilities, the key factor for ICT integration is teacher beliefs (Ertmer & Ottenbreit-Leftwich, 2010; Ertmer et al., 2012; Kim et al., 2013; Lawrence & Tar, 2018). ICT literacy in educational contexts may be viewed as innovation for teachers because they must see value in its applications to invest the time and effort needed to overcome the various intrinsic barriers associated with learning new skills (Ertmer & Ottenbreit-Leftwich, 2010). In order to incorporate ICT into pedagogy teachers must also innovate their practice—they are no longer simply subject-matter experts, but must also take on new roles, including being an instructional designer (plan and organize course components), facilitator (prompt and guide students), manager (manage the communication channels and orchestration), and social support (build student confidence and relationships over new social spaces) (Baran et al., 2011; Grammens et al., 2022; Zhu, 2010). Thus, ICT literacy is innovation, because as teachers learn about ICT and methods to integrate it in their teaching, they must think about technology and teaching in new ways, overcome barriers, and take on new roles.

### 1.3 Teachers as opinion leaders

Opinion leaders display “disproportionately great influence” on the decision intentions of others (Katz & Lazarsfeld, 1966, p. 32), and accelerate diffusion through their social influence and networks. Innovation adoption is associated with various risks (e.g., cost to change operations, time-cost, and the cognitive burden to learn new innovations, etc.). As such, most people are averse to adopting innovation. Opinion leaders support diffusion of innovations by gaining new knowledge of innovation and being in positions of power or influence where they can persuade others in innovation decisions so that it may be diffused (Figure 2).

There is extensive research on the profound effects of opinion leaders (Rogers, 2010, Chapter 8 & 9). In educational contexts some teachers can act as opinion leaders to support new pedagogical strategies (Atkins et al., 2008) and act as a technology leader by sharing their expertise and showing how technology can work and encouraging others how to use it (Masullo, 2017). Certifications offered by Big Tech corporations (Microsoft Certified Educator, Google Certified Educator, Apple Distinguished Educator) suggest teachers are identified as an important agent for market diffusion of educational technology products. This suggests teachers in education are in a position where they can also support diffusion of ICT literacy. Research indicates they can act as opinion leaders to support student ICT literacy development as they introduce and teach tools to students, and can support other teachers in their technology implementation through peer learning communities (Inan & Lowther, 2010; Owen et al., 2018).

As such, the research demonstrates the social role of the teacher as an important influence for innovation in education. In the EFL context, teachers use English in a country where the local language used by the majority population is another language (e.g., English in Japan). EFL teachers are in a unique position diffuse information to different populations as they operate in a cross-cultural context. Indeed, Japanese higher education internationalization policies have included English Medium Instruction (EMI)—teaching content through English, and the hiring foreign faculty (not necessarily for language teaching) as a key policy objectives (MEXT, 2012, 2014) to develop their human resources and international education offerings (Rose & McKinley, 2018).
These policies suggest that faculty are valued as potential agents for the infusion of international approaches. EFL teachers can be Native English-Speaking Teachers (NEST) or Non-Native English-Speaking Teachers (NNEST). NNEST teachers can be local natives native of the country (e.g., Japanese teachers teaching English in Japan), or those who have learned English as a second language to a high proficiency (e.g., someone of German origin teaching English in Japan). NEST and NNEST teachers have different linguistic and cultural backgrounds and working in intercultural teams can promote the sharing of new ideas and pedagogical approaches (Haga, 2021; Tajino & Tajino, 2000). However, there is little research that examines their role in ICT literacy diffusion. As such this aims to add to the scholarship on ICT literacy diffusion in the Japanese higher education context.

This paper consists of six sections. Section two introduces the key tenets of the theoretical framework underpinning this study. Section three outlines the research design and method used in this empirical research. Section four presents the findings. Section five discusses the key findings and future implications. Finally, section six concludes the paper.

2. Theoretical framework

2.1 Diffusion of Innovation theory

This study applies Diffusion of Innovation (DoI) theory (Rogers, 2010) to examine how innovations (new technologies and new ways to use familiar technologies) are diffused in a Japanese university EFL context through teachers. Diffusion is “the process by which (1) an innovation (2) is communicated through certain channels (3) over time (4) among members of a social system” (Rogers, 2010, p.35). DoI theory (Rogers, 2010), conceptualizes 5 stages of innovation adoption (Figure 3).

Within this model, the first stage, “Knowledge” contains three levels: (1) Awareness-knowledge: of the innovation’s existence; (2) How-to-knowledge: use of the innovation; (3) Principles-knowledge: to describe how and why an innovation works (Figure 4). It is this knowledge that flows through communication channels to be diffused to new places of adoption.

Figure 3. Innovation decision process (Reproduced from Rogers, 2010, p. 177)
Rogers’ diffusion of innovations theory has been applied to educational technology studies (Arnold & Sangrà, 2018; Dooley, 1999; Sahin, 2006), and in English language education on paradigm shifts on the view of Global English in language teaching (Rose et al., 2021). However, this is the first research to examine the position of EFL teachers as opinion leaders in ICT literacy diffusion in education in Japan.

3. Method

The guiding research question for this study was: How do EFL teachers influence ICT literacy diffusion in the Japanese university context?

The following section explains the methodological choices aligned with this question.

When beginning to explore an area, inductive qualitative methodologies are recommended to provide a nuanced understanding of the phenomena under investigation (Creswell & Plano Clark, 2018). This exploratory study employed a case study approach. Qualitative data were collected from two sources (teachers and students) to provide a rich, nuanced explanation of the phenomena under investigation—the influence of the EFL teacher in the process of ICT literacy diffusion. To triangulate findings two methods were used to collect data: a questionnaire survey for students, and in-depth interviews of teachers and students. Due to the preliminary and exploratory nature of this study a small but purposeful sample size was deemed as appropriate. The small sample size limited the study in terms of the generalizations that can be made. However the benefit of the small size to afford significant reflection, dialogue, and time on each transcript to identify and examine deeply underlying themes was determined as more pertinent for this preliminary study than superficial descriptive analysis over a greater number of individuals (Braun & Clarke, 2006).

3.1 Study design and participants

The research questions sought to examine the flow of digital innovation through EFL teachers. In order to triangulate findings data was collected from two sources: teachers and students. To answer RQ1: data were collected from students and teachers using two methods: a questionnaire survey and interviews. A questionnaire administered to the students was determined as the best way to gather initial themes from the students. Following the preliminary identification of themes purposeful selection of a small sample of students (n=2) were invited to participate in a semi-structured interviews to triangulate student questionnaire and teacher self-reported perceptions of technologies and pedagogies used in classes. To answer RQ2, teachers purposefully selected were interviewed to understand how they made sense of their beliefs and positionality as they selected and integrated technology in their instructional design. There has been extensive research on the perceived differences of Native English-Speaking Teachers (NEST) and Non-Native English-Speaking Teachers (NNEST) (e.g. Aslan & Thompson, 2017; Chun, 2014; Ma, 2012; Tajino & Tajino, 2000). Thus, Japanese, and native English-speaking teachers offer different sociocultural insight to the phenomena explored, so two teacher case groups were determined: NEST and Japanese NNEST teachers and teachers from each group were purposefully selected to participate in the study.

3.1.1 Questionnaire design

The questionnaire administered to students sought to contextualize student technology knowledge and triangulate data collected from interviews. Two surveys were created. The first 5-item questionnaire (Appendix A) was designed to scope what technology students were familiar with. Questions were mainly close ended and asked what types of technology (e.g., Microsoft Office, Google Apps, Japanese Apps, etc.) they used prior to starting university and what they are currently using and how they were introduced technology in their classes. The second questionnaire (Appendix B) sought to examine the transfer process from view of the students. This survey consisted of 12 items and was a mix of
open and closed-ended questions that sought to identify the technology they are using, how they are using it, how they were introduced to new tools in their classes, and if they perceived differences between Japanese and non-Japanese teachers in terms of in-class technology use.

3.1.2 Interview schedule and participants

To focus on the phenomena in question participants selected for interview were teachers who proactively used digital technology pre-pandemic. The Covid-19 pandemic caused universities in Japan to move online, thereby causing all teachers to use technology for their classes. To limit the effects of the mandatory move to online teaching during the pandemic, only teachers that used technology in their classes prior to the pandemic were invited to participate. Thus, teachers that only used basic digital (e.g., email) or hardware technologies (e.g., overhead display, photocopy machines) pre-pandemic were excluded. Included were those who asked students to submit work via a course management system, or software applications, or used technology for their own administrative purposes (e.g., grading, presenting, etc.). After many discussions with both Japanese and non-Japanese EFL teachers, one Japanese (J1), and two NEST teachers (E1, E2) (Table 1) were purposefully selected for interviews due to their experience and ability to provide rich description of the phenomena (Merriam & Tisdell, 2016).

Students were recruited for surveys and qualitative interviews. Students are predominately from a middle-class socioeconomic background, ages from 18-21. All first-year students in the university the data was collected from must take five mandatory English classes (discussion, debate, reading & writing, presentation, e-learning), with levels determined by school placement tests. From the second year English is an elective option. The researcher conducting the interviews has limited Japanese proficiency. Therefore, only students with advanced English proficiency (Common European Framework of Reference for Languages (CEFR) level B1), were considered eligible for interview. Two third-year students (Table 2) were selected and interviewed as they would be able to discuss perceived differences before and after the pandemic switch to online learning.

Regarding ethical considerations, only students that were not in classes taught by the researcher were approached to participate. This ensured that participation was voluntary and that data provided would not be affected by power relations from a current teacher-student relationship. The research was approved by the university ethics committee and informed consent was provided by all participants.

### Table 1. Teacher participant demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>J1</th>
<th>E1</th>
<th>E2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>35-45</td>
<td>35-45</td>
<td>35-45</td>
</tr>
<tr>
<td>Years in Japan</td>
<td>10+</td>
<td>10+</td>
<td>10+</td>
</tr>
<tr>
<td>Japanese Proficiency</td>
<td>Native</td>
<td>Advanced</td>
<td>Limited</td>
</tr>
</tbody>
</table>

### Table 2. Student interview participant demographics

<table>
<thead>
<tr>
<th>Variable</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Gender</td>
<td>Female</td>
<td>Female</td>
</tr>
<tr>
<td>Year</td>
<td>Year-3</td>
<td>Year-3</td>
</tr>
<tr>
<td>Major</td>
<td>Literature</td>
<td>Literature</td>
</tr>
<tr>
<td>English CEFR-Level</td>
<td>B1</td>
<td>B1</td>
</tr>
<tr>
<td>Japanese</td>
<td>Native</td>
<td>Native</td>
</tr>
</tbody>
</table>

3.2 Data collection

Data were collected in one university in Tokyo, Japan during Covid-19. The pandemic altered worldwide technology use in education; this university switched to 100% emergency online learning. Data were collected in two ways: Questionnaires (two sets) and Interviews (five total). Questionnaire 1 was sent to 173 students through an online form and 33 responses were received (19.1% response rate). Questionnaire 2 was also collected through an online form and sent to 81 students and 13 responses were received (14.7% response rate). The email and questionnaire were bilingual, Japanese responses were permitted, and students could answer only the questions they wanted.

Data was collected by purposefully selecting and conducting in-depth semi-structured interviews of two students (S1, S2) and three EFL teachers (J1, E1, E2) over Zoom and recorded. Participants were given the questions in advance however, the conversation was natural with follow up questions. Interview times varied (20mins – 60mins).
3.3 Context

Research occurred during Covid-19 and all classes were conducted online, thus technology use increase is expected. Table 3 presents the data collected from the survey regarding student use of different types of technology. Notably the greatest changes occurred in use of Zoom and Google products—the switch from high school to university during the pandemic resulted in almost all students using Zoom, also Google products increased significantly 181.8%-600%. Comparatively, students used Microsoft products at higher rates before starting university (72.7% Microsoft-Word versus 9% Google-Documents). Although limited in assessing depth (how students used the technologies), this data provides insight into students’ knowledge prior to university. The diffusion of innovation analyzed in this study includes these technologies as well as the other technologies students mentioned in Questionnaire 2 (FlipGrid, Jamboard, Blogs, CamScanner, Evernote, Webex, Dropbox).

3.4 Analysis

In this convergent qualitative multi-method study, results were analyzed independently and then paired to identify areas of convergence or divergence (Figure 5; Cresswell & Plano, 2018).

Table 3. Student educational technology use pre-university and during university

<table>
<thead>
<tr>
<th>Technology</th>
<th>Pre-University</th>
<th>During University</th>
<th>% change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft-Word</td>
<td>24 (72.7%)</td>
<td>33 (100%)</td>
<td>37.5%</td>
</tr>
<tr>
<td>Microsoft-Powerpoint</td>
<td>20 (60.6%)</td>
<td>32 (97%)</td>
<td>60.0%</td>
</tr>
<tr>
<td>Microsoft-Excel</td>
<td>15 (45.5%)</td>
<td>17 (51.5%)</td>
<td>13.3%</td>
</tr>
<tr>
<td>Microsoft-OneDrive</td>
<td>4 (12.1%)</td>
<td>11 (33.3%)</td>
<td>175.0%</td>
</tr>
<tr>
<td>Google-Drive</td>
<td>11 (33.3%)</td>
<td>31 (93.9%)</td>
<td>181.8%</td>
</tr>
<tr>
<td>Google-Documents</td>
<td>3 (9%)</td>
<td>19 (57.6%)</td>
<td>533.3%</td>
</tr>
<tr>
<td>Google-Slides</td>
<td>2 (6%)</td>
<td>14 (42.4%)</td>
<td>600.0%</td>
</tr>
<tr>
<td>Google-Sheets</td>
<td>2 (3%)</td>
<td>11 (33.3%)</td>
<td>450.0%</td>
</tr>
<tr>
<td>Zoom</td>
<td>1 (3%)</td>
<td>30 (91%)</td>
<td>2900.0%</td>
</tr>
</tbody>
</table>
Figure 5. Visual model of research design

Table 4. Code descriptors

<table>
<thead>
<tr>
<th>Code descriptors</th>
<th>Items related to</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge (awareness)</td>
<td>finding out about new technologies</td>
</tr>
<tr>
<td>Knowledge (how-to)</td>
<td>knowing how to use the new technology</td>
</tr>
<tr>
<td>Knowledge (principles)</td>
<td>understanding how to explain that new technology to others</td>
</tr>
<tr>
<td>Persuasion</td>
<td>influence in the adoption or rejection of a new technology</td>
</tr>
<tr>
<td>Decision (adoption)</td>
<td>decisions leading to the adoption of new technology</td>
</tr>
<tr>
<td>Decision (rejection)</td>
<td>decisions leading to the rejection of new technology</td>
</tr>
<tr>
<td>Implementation</td>
<td>how the technology was implemented</td>
</tr>
<tr>
<td>Confirmation</td>
<td>use of the technology outside of the context in which it was introduced (i.e., the class)</td>
</tr>
</tbody>
</table>
4.1 EFL teachers’ position of authority can fast-track ICT use straight to student adoption

The findings from the questionnaires and interviews suggest that in classes where teachers use or assign a particular technology, teachers move innovations they assign straight to student adoption—by-passing the first three stages of the decision process for students (Figure 6). Teachers would introduce the tool (knowledge) and inform students they would be using it in their class and rationalize the use and require them to use it (persuade, decision, adoption).

Students indicated that they would register for accounts teachers when their teachers asked them to. Data from the interviews suggests students were compliant and had implicit trust in the teachers’ decision to use a particular tool in their classes (Table 5).

Teachers recognize student compliance to their requests (Table 6). They would enact their authority to decide the technology and then persuade—or give students their rationalization of why that tool was selected.

As such the findings suggest that teachers and students acknowledge the teacher’s authority to use technology tools and students will adopt the technology for the class purposes if teachers rationalize it and provide support on how to use it.

4.2 EFL teachers can facilitate ICT knowledge depth

Findings from the student questionnaire indicated that teachers enhanced the depth of awareness-knowledge and how-to-knowledge depending on the methods they used to introduce the ICT skill. If they demonstrate it together in class with the students and use their sociolinguistic knowledge of the students’ local culture to scaffold adoption (e.g., Japanese instructions, cultural-sensitive methods) ICT literacy awareness and how-to-knowledge was enhanced.

Teachers enhanced awareness-knowledge by assigning innovations for coursework and introducing new ways to use familiar technology. For instance, S1 had a Gmail account before entering university but was unaware of other google
tools. She knew how to use Word but learned how to work asynchronously on documents through Google Drive in her pre-pandemic English class when the teacher taught them for a group project. Thus, her teacher enhanced her awareness-knowledge by introducing Drive, and that a Word document can be worked on asynchronously. Also, students mentioned they learned about new technologies from their teachers (e.g., CamScanner, and WordPress).

Student responses from the second survey (Appendix B) and interviews indicate that teachers can enhance how-to-knowledge, depending on the methods that they use to introduce the technology. 100% of the students (n=11) who responded to the open-ended question 6 (“What are the most effective ways for you to learn new technologies from the teacher?”) responded that the most effective way for teachers to introduce new technology to students is in class practice with teacher support (Table 7).

The follow-up, open-ended question 7 asked “why is this the most effective way for you?” and most students responded for them it was more effective to do it together in class than watching a video or reading instructions (Table 8).

### Table 5. Student compliance to teacher technology requests

<table>
<thead>
<tr>
<th>Participant</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Interviewer: If your teacher were to ask you and say, “for my class we need to use this tool” What would you do? S1: Yeah, I think I will register.</td>
</tr>
<tr>
<td>S2</td>
<td>Interviewer: Have you ever had to register your like email or something? Like for example M reader, or Reddit. Did you have to register an account there to use that website with your email address or? S2: Yes. I created an account. Interviewer: How do you feel about like having to create an account like that? S2: I don’t mind to create an account. And it’s easy to create my account, Because teachers, taught me how to create the account in his class.</td>
</tr>
</tbody>
</table>

### Table 6. Teacher recognition of student compliance to teacher technology requests

<table>
<thead>
<tr>
<th>Participant</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td>I didn’t experience any difficulties, but I got a question from one student. Why do I have to submit one document to two places and it’s really confusing. So could you choose one platform? So, I had to explain that they those two things have different functions. And after I said that he completely understood. I can’t think of any trouble in terms of introducing technology to students.</td>
</tr>
<tr>
<td>E1</td>
<td>Interviewer: Did you ever have any experience where you’ve met like a student who had like really strong like resistance against those kinds of technology? E1: No, I try to be as explicit as possible in the beginning of the course, and as we do things and if I make a change and I say in the first class we’re probably going to change the syllabus. We will see what we need to do, but I’ll give you warning, and I’ll give you a reasoning and write out announcements with here’s what we’re going to do.</td>
</tr>
<tr>
<td>E2</td>
<td>Interviewer: Have you ever had like a student that didn’t want to sign up for M reader? or what would you do in that case? E2: No. Usually students in Japan will do what I ask, so I haven’t really, you know. I mean within reason I don’t ask him unusual things so. But like you know, I often justify a rationale. Rationalize and justify why I’m using particular tools. I will explain to them as I’m explaining especially the first day when we’re setting things up, I always explain why we’re doing something, so they don’t usually have any concerns about it, so the biggest concerns are, “oh, I don’t know technology very well” That kind of thing, or “I don’t know how to use this”. And so I’m like, OK, we’ll learn together. Don’t worry.</td>
</tr>
</tbody>
</table>
Table 7. Effective Ways to Learn New Technologies in Class: Sample Student Responses (Note. Translations were made by the researcher with the assistance of an online translation tool (Google Translate))

<table>
<thead>
<tr>
<th>Original response</th>
<th>English translation</th>
</tr>
</thead>
<tbody>
<tr>
<td>実際に使っている場面を共有しつつ、日本語で説明する方法</td>
<td>Actually use it together, with Japanese instructions</td>
</tr>
<tr>
<td>Teachers teach students how to use technology in the class is the most effective.</td>
<td></td>
</tr>
<tr>
<td>一緒に挑戦すること</td>
<td>Challenge it together</td>
</tr>
<tr>
<td>実際にそのテクノロジーを生徒に使う授業をすること</td>
<td>Actually teach students how to use the technology in class</td>
</tr>
<tr>
<td>画面共有でやり方を先生から教わる。</td>
<td>The teacher shows how to use it sharing their screen.</td>
</tr>
</tbody>
</table>

Table 8. Reasons why students perceive in-class instruction of technology is effective

<table>
<thead>
<tr>
<th>Reason given</th>
<th>Responses (n=11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can ask questions</td>
<td>1 (9%)</td>
</tr>
<tr>
<td>Easier to remember</td>
<td>1 (9%)</td>
</tr>
<tr>
<td>Difference between reading instructions, watching a video and actually using it.</td>
<td>9 (82%)</td>
</tr>
</tbody>
</table>

Table 9. Least effective methods for students

<table>
<thead>
<tr>
<th>Method</th>
<th>Responses (n=10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Only text or video students use on their own</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Using only English</td>
<td>2 (20%)</td>
</tr>
<tr>
<td>Teacher telling them or showing them in class as students watch without practice or a follow up document</td>
<td>5 (50%)</td>
</tr>
<tr>
<td>Teacher assumes that the students already know how to do it or can find out on their own e.g., YouTube</td>
<td>1 (10%)</td>
</tr>
</tbody>
</table>

Table 10. Student reasons why methods were not effective

<table>
<thead>
<tr>
<th>Method</th>
<th>Responses (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot ask questions</td>
<td>2 (22%)</td>
</tr>
<tr>
<td>Cannot understand clearly</td>
<td>7 (78%)</td>
</tr>
</tbody>
</table>

Table 11. Student language preferences for instructions

<table>
<thead>
<tr>
<th>Response</th>
<th>Number (total n=8)</th>
</tr>
</thead>
<tbody>
<tr>
<td>English only</td>
<td>1 (12.5%)</td>
</tr>
<tr>
<td>Both English &amp; Japanese</td>
<td>2 (25%)</td>
</tr>
<tr>
<td>Japanese</td>
<td>5 (62.5%)</td>
</tr>
</tbody>
</table>
Open-ended question 8 asked students to indicate the least effective ways to learn new technologies in class (Table 9). The responses indicated least effective methods were those with limited teacher support. For example, sharing a link to a video or giving text instructions that students were expected to follow on their own (n=2, 20%), or using only English to explain how to use the technology (n=2, 20%), or assuming that the students already know the technology or can easily find out how to use it on their own (e.g., search YouTube) (n=1, 10%). Most respondents (n=5, 50%) indicated that a teacher just explaining the technology to students without showing them how to use it, or only showing them how to use it once in class without a follow-up was for them the least effective method.

Question 9 asked students for their reasons why these were not effective, and two responses were given: students could not ask questions (n=2, 22%), and they could not understand clearly (n=7, 78%) (Table 10).

Student interviews also indicated how a teacher’s practice can influence technology knowledge transfer. For instance, S1 mentioned how explanations that are too fast make it difficult for her to understand how to use the tool:

Now I take English teacher’s class and his explanation is sometimes too quick for me...then I can’t understand. So, I want teachers to explain more slowly. – S1

These findings are from a small pool which limit the generalizations that can be made, however they suggest that new technology adoption is very challenging for students. Furthermore, the findings indicated that in-class teaching provided a space for students to receive more support to understand how to use new technology.

One key factor for the student respondents was the use of Japanese to explain how to use the technology. In the same survey (Appendix B), question 5 asked students the best way for them to learn new technology. Of the 11 responses to the question regarding the best way to learn how to use technology, 8 responded to language items. Of those responses 87.5% indicated they preferred to have Japanese instructions (Table 11).

Qualitative interviews corroborated the importance of using the students’ native language:

Very easy explanation is OK only in English, but about technology I want Japanese explanation...I want to understand, to be clear, so I prefer Japanese explanation. - S1

Therefore, in addition to the way teachers introduce technology, the choice of language can mediate how-to-knowledge acquisition in EFL contexts. Use of the students’ mother tongue can enhance understanding, while fast explanations in a second language can impede it.

The interviews with teachers corroborated the findings that students found the introduction of new technology very difficult and indicated methods participants used to scaffold student technology use in their classes influenced technology adoption. J1 and E2 indicated that they used Japanese in their instructions when students had difficulty understanding how to use the new technology. Japanese students display a tendency to ask few questions in classes (Davies & Ikeno, 2011; Kasuya, 2008; Muto et al., 1980; Okada, 2016). E1 and E2 indicated sociocultural sensitivity towards their Japanese student’s reluctance to ask questions in class and would make more of an effort to check on students to make sure they understand. For instance:

a lot of my Japanese students tend to be very quiet, and they won’t ask questions, and so if they are experiencing problems while doing something like setting up M reader or linking something to the Google sheet, I have two coax any problems that they’re having out of them, like you know, is everybody OK? Is anybody having any problems?

And I can see them just sitting there, and I will just continue to repeat. “Everyone OK? Any problems?” and I will watch their faces. And because I’ve been in Japan for so long, I can usually tell OK, that student right there is having issues and I know they’re having issues because I can tell by the look on their face and they’re not going to ask me unless I address them directly. - E2

J1 indicated she supports students technology use step-by-step with a model task completed in class to confirm understanding—a pedagogical method familiar to Japanese students (Williams, 2017). A limitation in this research is that the students from these teachers’ classes were not asked to confirm the effectiveness of their efforts. However, the data from the survey seems to corroborate that the methods the teachers introduced in the interviews: asking students individually if they have questions, using Japanese, and working alongside the students as they learned the technology are helpful to assist their how-to knowledge of that tool. This suggests that teachers can scaffold student technology knowledge with their sociolinguistic knowledge and culturally appropriate methods.
There was only one coded response that referred to student principles-knowledge, and that was related to S1 mentioning asking her friends for help when they didn’t understand. This peer-to-peer learning suggests that some students might acquire principles-knowledge, however it was not clear if this knowledge was derived from the student’s learning in the class or from other sources. Further exploration is a recommendation for future research.

Although the sample size was small the findings from this preliminary study suggest that technology knowledge depth is influenced by teacher practices. Teacher power authority in the classes can increase knowledge-awareness of new technology innovations (through the intrinsic right found in their position of authority to require students to use a tool in their classes). Also, the methods teachers use to introduce the technology can influence student technology how-to knowledge. Innovation adoption is challenging for students and that is amplified when learning a new tool in a second language. Culturally sensitive methods and use of local language teachers can enhance student adoption. Figure 7 is a suggested representation from the findings of how students’ ICT knowledge depth can be enhanced with teacher sociolinguistic knowledge and culturally responsive methods.

In Figure 7, before the course students have different levels of knowledge-awareness and how-to knowledge for a technology. During the course, the teacher assigns a technology to use in class, consequently student awareness-knowledge & how-to-knowledge are enhanced to do the class tasks. After the course completion some students may continue to use the technology, some stop, but all student awareness-knowledge & how-to-knowledge have increased due to course work & teacher introduction—making it easier to use again in the future.

4.3 EFL teachers can influence ICT Literacy diffusion breadth

The findings in this study suggest that EFL teachers can influence innovation diffusion in breadth through teacher-student and teacher-teacher networks. Teacher-student diffusion occurred in this study through teachers who assign technology related tasks in their classes. Student interviews and the survey indicated they learned how to use new technology from their teachers. The teachers in this study teach at least 8 classes a week at one institution and had 2 to 4 additional classes at another institution. Teachers reported their classes had 10 to 130 students. As introduced in the previous section, teachers were aware of their authority in class and would assign tasks and teach students how to use a particular technology to complete the task. Thus, one teacher requiring students to use a particular tool in a class would diffuse that innovation in breadth across all students.

**Figure 7. ICT knowledge depth enhancement through teachers**
Teacher-teacher diffusion occurred through knowledge sharing in peer networks. All teachers in this study learned about technology innovation (e.g., new tools, or how to technology in different ways) through other teachers (Table 12).

Colleagues influenced decisions due to credibility from shared contextual understanding and would go to their peers before the IT department in the institution. All three teachers indicated that they would follow the policies if a technology tool was banned specifically by the institution or if they were told they had to use a tool (e.g., input grades in a specific tool). However, they seek help and recommendations from their co-workers. E2 and E1 perceived that the institution IT and admin had ulterior motives so would not ask them for help. For example:

My feeling is the admin don’t know what they’re talking about. They’re completely useless. Basically, they deal with contracts …yeah, I completely ignore them. I don’t really care what they recommend or say unless they have, you know, firm rules and they say you cannot use this, so you must use it. That’s fine. I’ll obey the rules. – E1

As such, the teachers in this study were influenced by other teachers through teacher-teacher sharing in peer learning networks. This suggests that the university can provide a social context for diffusion information to be spread, it can be enforced, but volitional diffusion also occurs in peer learning networks. Also, the findings suggest that teacher-teacher diffusion can be transcultural, where, as mentioned above, J1 learned about the (Western) tools that her (mainly native-English speaking) colleagues were using. This suggests organizational culture and relationships between local and native English-speaking teachers can influence local teachers’ technology knowledge and use and potentially vice versa. Although in this study there was no indication of the non-local teachers learning about Japanese tools. Future research is recommended to explore in more detail transcultural diffusion of technology products in intercultural work teams.

The small number of participants limit the generalizability of the findings. However, the preliminary findings suggest that innovation diffusion can spread in breadth through other teachers via their role in peer learning.

5. Discussion

This study helps researchers better understand how the EFL teacher can influence ICT literacy diffusion. In particular, the study identified three ways teachers can influence ICT literacy in the EFL higher education context in Japan: (1) their authority as teachers removed the need for students to decide what technology to use and accelerated innovation adoption for students; (2) the methods they use introduce ICT to students, and (3) knowledge sharing through communities of practice influenced diffusion depth and breadth for their students and other teachers. These findings support the scholarship on teachers as opinion leaders (Atkins et al., 2008; Zhu, 2010) and can act as an “agent for change” (Ertmer & Ottenbreit-Leftwich, 2010).
Similar to other studies that have demonstrated an implicit recognition of teachers as exercisers of authority in the classroom (Harjunen, 2009, 2011; Shin et al., 2009; Sugimoto, 2020), the participants in this study recognized the authority of the teacher in technologies used in class. The teachers’ position in Japan is one of authority (Shin et al., 2009; Sugimoto, 2020) and thus when they introduce technology in their classes the innovation decision making process for students seems to bypass the first three stages to go directly to adoption (Figure 6). Furthermore, teachers influenced the breadth and depth of student ICT literacy depending on their methods they introduced the technology to students. EFL teachers’ cultural responsiveness (Gay, 2002) enhanced integration through their explanations using the student local language and their cultural sensitivity in the ways that they introduced the new technology. The finding that students preferred teacher use of their mother tongue (Japanese) to introduce new technology confirms scholarship that suggest native language instructions is important for EFL students (Saito & Ebsworth, 2004). Thus this study supports calls to include local culture in technology integrated teaching practices (e.g. Giri et al., 2019; Min et al., 2008).

Teachers in this study made technology decisions based on their personal beliefs and through discourse with their peer teachers. The findings about teacher beliefs affecting technology integration is expected due to the large body of scholarship that indicates the critical role of teacher beliefs on technology practice (e.g. Abbitt, 2011; Ertmer, 2005; Ertmer et al., 2012; Hasan, 2017; Jääskelä et al., 2017; Kim et al., 2013; Michel, 2018). However, the role of the discourse with other peer teachers in influencing teacher technology practices is less researched. Research provides evidence that teacher peer learning networks and communities of practices can act as a tool for teacher knowledge development (e.g. Bannister, 2018; Hodge, 2022; Lamb, 2015; Tam, 2015; van As, 2018). This study supports this with the focus of technology integration in an intercultural context. Research suggests that school organizational culture can affect individual technology decisions (Huang & Teo, 2019). This study adds to our understanding about how intercultural departments can provide fertile space for transcultural diffusion through cross-cultural peer learning networks. Thus, the findings from this study suggests that position of the EFL teacher can influence the breadth and depth of education ICT literacy diffusion through students and other teachers (Figure 8).

In this figure the school policies and systems enabled or prohibited the use of various tools. However, teacher agency and authority in classes led to student adoption of technologies teachers selected for classwork. One teacher assigning a technology class would diffuse and enhance literacy of that tool for all students. Even if students do not continue to use the tools immediately after the course, experience using the tools enhances familiarity which has a positive influence on evaluations of products and future adoption is eased (Gefen, 2000; Yushau, 2006). Also, familiarity of a technology influences costs associated with changing to different tools which encourages classroom dependencies on familiar products rather than a new one (Burnham et al., 2003). Teachers would share information to other teachers who might use it in their classes and potentially further diffusing that ICT skill to their students and other teachers.

5.1 Implications

Policy should not only consider ICT literacy of teachers but also recognize ICT literacy diffusion through teachers. Although ICT literacy development is valued as a policy goal in Japan (MEXT, 2011, 2012), the focus of implementation efforts has mainly been to develop hardware accessibility and network infrastructure (International Trade Administration, 2021; JETRO, 2021; MEXT, 2020a, 2020b). Many technology corporations have identified the position of the teacher as a possible agent to diffuse their products (e.g., Apple Inc., 2023; Google LLC, 2023; Microsoft Corporation, 2023). The findings from this study suggests that policy can also recognize teachers as a potential vehicle to support their efforts for digital transformation through enhanced ICT literacy diffusion through teachers.

Implications for teacher professional development include recommendations for more focus on ICT training for
teachers and the provision of spaces to foster peer learning communities. This study found that native English-speaking teachers could feel restricted in how they explain technology to students in foreign language contexts due to teacher and student linguistic limitations. Students also reported a variety of ways teachers introduced technology to them, from just explaining it in class in English (a second language to them) to walking through how to use it step by step with Japanese explanations. ICT training for teachers in foreign language contexts should consider not only how the teacher can use the technology, but how they can explain it to students who might not share the same linguistic and cultural background. This may include the provision of bilingual resources they can use to share with their students. Also, this study found that social spaces at work and peer learning networks were more critical in developing teachers ICT literacy than institutional IT support services. Universities have many different departments and intercultural work teams. This can provide a fertile ground for knowledge sharing. The findings from this study suggest ICT policies universities should not only rely on their IT departments to train teachers, but also consider ways to create and/or enhance existing collaborative and social spaces where teachers can informally learn from each other how to use technologies in their specific context.

The implications for teacher practice include a need for self-criticality and culturally responsive ICT practice in the class. The cognitive and psychological challenges of learning new technologies are amplified in EFL contexts where teachers and students may not share the same linguistic or cultural background (Bandyopadhyay & Fraccaostoro, 2007; Li & Walsh, 2011; Min et al., 2008; Nistor et al., 2013; Nistor et al., 2014; Wong, 2015). For students in this study, more important than having instructions on how to use a new technology was the way in which the instructions were delivered. Also, they wanted the space in class to learn the tool, so they could ask the teacher (or other students) questions. This suggests that teachers should give time in class for students to try out the tool rather than simply explaining it and assigning it as homework. Also, in EFL contexts they should consider supplementing English instructions with the local language to alleviate some of the cognitive burden associated with learning a new technology in a foreign language. In practice teachers need to be self-critical about their reasons for selecting a particular tool (e.g., was it selected simply because the teacher is familiar/comfortable using the tool, or because it is the tool that the students can use most easily?), and their assumptions about what the students need in terms of explanations on how to use a new tool in a foreign language.

5.2 Limitations

The number of participants in this study was small. This limits the generalizations that can be made from these findings. However, for this preliminary study the size was deemed appropriate because of the exploratory nature and the focus on identifying ideas about the topic (Braun & Clarke, 2006). A second limitation was the university middle-class context. An elementary, junior or senior high school context would impose different restrictions on teacher autonomy due to students’ age. Also, the context is in Japan and may not reflect the situation in other countries where teachers have different restrictions placed on technology selection (e.g., China), or reduced power-authority values associated with the student-teacher relationship. A third limitation is the reliance on self-reported beliefs of teachers and students—recommendations for future research include in-class observations and interviews with institutional decision makers to get a more holistic view of ICT literacy integration. Finally, the research was conducted during the Covid-19 switch to emergency remote learning—the technology integration may change when teachers resume face to face classes. Despite these limitations, the rich data derived from the qualitative methods in this study provide insight into the influence of EFL teachers on ICT literacy diffusion that is appropriate for this exploratory study and basis for future research.

6. Conclusion

This preliminary qualitative case study applied DoI theory to investigate the role of the teacher in the diffusion of ICT literacy in a Japanese university EFL context. The findings suggest that digital transformation in foreign language education can be enhanced through ICT literacy diffusion by EFL teachers. The research examined how EFL teachers influence student knowledge and adoption of educational technology in the Japanese university context. The findings indicate that EFL teachers can influence technology knowledge depth in students through their authority in the classroom and the methods they use to teach new technologies to students. Also, EFL teachers can influence technology breadth through teacher-student and teacher-teacher interactions. One teacher can teach a technology to many students and teachers learn about innovations in peer learning networks. In this study, the EFL context with English speaking teachers and English language policies enhanced the transcultural flow of technologies to local markets, where EFL teachers with local sociolinguistic knowledge would provide more support to students to learn new technologies. However, it depends on the methods

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teachers use. A teacher describing how to do the task or sharing a link to an English video tutorial is not perceived as effective for Japanese students as going through the task and doing it together in class where they can ask questions. This study is limited in size and recommendations for future research include analyzing these themes across larger teacher and student populations. Also, the transcultural diffusion appeared to be one sided where Western technologies (i.e., Google, Microsoft) were introduced into the Japanese market, further research examining the nature of transcultural diffusion of products in the EFL context is suggested as an area to explore in more detail. Implications for digital transformation and ICT policy in Japan include a stronger call to go beyond hardware and infrastructure capability and to think more broadly about the conceptualization of ICT literacy. There are many socio-psychological barriers related to ICT integration (Ertmer, 1999, 2005; Ertmer & Ottenbreit-Leftwich, 2010; Ertmer et al., 2012; Tondeur et al., 2017). This suggests that ICT literacy is a social construct. As such, education should consider the social agents that influence digital transformation. This study provides some evidence for more recognition of the EFL teacher as a social agent for change (Badley, 1986) in digital transformation and ICT literacy diffusion.
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Appendix A: 5-item questionnaire sent to mixed level 1st and 2nd year students

1. 大学入学前に、Gmailアカウントを持っていたか？Before you started university did you have a Gmail account?
   - Yes
   - No

2. 入学する前は、以下のテクノロジーうちどれを使用していましたか？(該当するものをすべて選択) Before you started university what technology did you use?
   - Microsoft Word
   - Microsoft PowerPoint
   - Microsoft Excel
   - Microsoft OneDrive
   - Google Search
   - Google Drive
   - Google Documents
   - Google Slides
   - Google Sheets
   - Zoom
   - Nothing
   - Other (please specify)

3. 入学をしてから、現在どのテクノロジーを使用していますか/使用し続けていますか？(該当するものをすべて選択) Since you started university what technology are you using/continue to use?
   - Microsoft Word
   - Microsoft PowerPoint
   - Microsoft Excel
   - Microsoft OneDrive
   - Google Search
   - Google Drive
   - Google Documents
   - Google Slides
Google Sheets
Zoom
Nothing

Other (please specify)

4. What tools do you think you will continue to use after you graduate university?

Microsoft Word
Microsoft PowerPoint
Microsoft Excel
Microsoft OneDrive
Google Search
Google Drive
Google Documents
Google Slides
Google Sheets
Zoom
Nothing

Other (please specify)

5. Why do you think you will continue or stop using these tools after graduation? (Japanese also accepted)
Appendix B: 12-item questionnaire to advanced level students

1. What are the technologies you have learned from your classes? (select all that apply):
   - Blackboard
   - FlipGrid
   - Google Classroom
   - Google Documents
   - Google Drive
   - Google Sheets
   - Google Slides
   - Google Jamboard
   - Microsoft Word
   - PowerPoint
   - Excel
   - Blogs
   - Zoom
   - Other (please specify)

2. Has a teacher asked you install an app on your phone?
   - Yes
   - No
   - Other (please specify)

3. If yes, what App was it?

4. What concerns do you have about using new technology? (eg. how to use it well, data, privacy, etc.)

5. Please think back to when you were first introduced to this technology by your teachers. What were some effective ways that they used to introduce and teach it to you? (select all that you feel were effective)
The teacher showed you in class and you wrote notes and tried it later at home.

The teacher did a training session and you could go step by step together.

In your opinion what are the most effective ways for you to learn new technologies from the teacher?

What ways are the least effective methods for you?

Why are these ways not as effective for you?

Have you noticed any difference between how Japanese teachers and non-Japanese teachers introduce technology to their students? (e.g., the types of technology, how it is used, how it is explained in classes, etc.)

If you answered yes, above can you please tell me a little more and give some examples?

Any other comments about how technology is introduced to you in your classes? (e.g., A message to teachers for us to know your feelings)