Analysis of faculty use and perceptions of ICT: planning for effective professional development at a Japanese HEI

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Abstract
For more than 20 years, Japanese HEIs have focused on ICT integration as a means to help students develop twenty-first century skills. However, effective ICT integration is only possible if faculty have an awareness of the possibilities of technology and see the value of a student-centered approach to teaching. This study was conducted to assess the current state of these qualities at a specific Japanese HEI for the purpose of facilitating meaningful professional development. A survey covering ICT usage, barriers to its use, and reasons for ICT integration was distributed to all full-time faculty at this institution. Results showed that ICT integration was superficial and indicative of teacher-centered pedagogy. Another key finding was identifying the perception that ICT is seen as more of a tool to increase teacher productivity than to improve student learning outcomes. Major obstacles to ICT integration were identified as a lack of technical support and a lack of professional development. Results indicate that planning for professional development that will lead to meaningful change in practice requires more than just providing support for how and what faculty can do with ICT. Faculty need to see the value of reclassifying their views regarding their role in higher education.

Keywords
Japanese higher ed · ICT integration · Barriers to ICT integration · Reasons for ICT integration

Introduction

Information and Communication Technology (ICT) has played an increasingly important role in higher education in the last two decades. It has been described as “an important catalyst and tool for inducing educational reforms that change our

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students into productive knowledge workers” (Pelgrum 2001, p. 163), and has led to the identification of twenty-first century skills such as information evaluation and critical thinking across the world. The integration of ICT, and the development of such skills has been recognized by several countries seeking to modernize curricula to prepare students for the needs of the modern age (Voogt and Roblin 2012). In Japan, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) highlighted this need in 2008 by stating that students needed to be prepared with the twenty-first century skills necessary to be active participants in the new global society and that Japanese Higher Education Institutions (HEIs) needed to be transparent in describing those skills (Occhi 2016). Assorted initiatives to accomplish this goal have been enacted since then. MEXT (2011) later published a report setting goals for the implementation of ICT in Japanese education. The focus of the report was on how ICT should be implemented to foster independent and collaborative learning, information literacy, communicative skills, the ethical use of technology, and in other ways, develop children who will become leaders in the twenty-first century. Teachers were tasked with “utilizing ICT in a manner that makes the most of its features” (p. 6).

As noted in the MEXT (2011) report, instructors in Japanese higher education institutions play a key role in the integration of ICT in teaching and learning. As is the case all over the world, instructors are often not prepared during their studies to teach with technologies, and the rapid advancement of technologies necessitates professional development for instructors in technology integration for teaching (Hutchison and Reinking 2011; Lawless and Pellegrino 2007). Furthermore, ICT use in teaching involves pedagogical transformation (Davies and West 2014; Ertmer and Ottenbreit-Leftwich 2013). ICT integration that fosters the development of twenty-first century skills is closely associated with student-centered pedagogies (Biddix et al. 2015; H. Liu et al. 2017), but in Japan, it has “mostly been used to perpetuate the teacher-centered teaching in a different format” (Aoki 2010, p. 854). Japan is a culture founded in Confucian ideals, where a student-centered focus does not traditionally align with a mindset where teachers are seen as “authority figures to be respected by the learners, learners are trained to take tests rather than to be inquisitive and think critically, and asking too many questions is considered rude” (Latchem et al. 2008, p. 623). Funamori (2017) states that despite the deployment of information technology, there has been less application of technologies for use in education, and that a lack of ICT skills is one of the barriers to effective ICT adoption in Japanese education.

Changes in teaching practice are more likely to occur when faculty become explicitly aware of their own practices, the practices of their colleagues, and through professional development that seeks to raise awareness of ICT’s pedagogical possibilities (Hakkola et al. 2021; Kirkwood and Price 2013; Miller 2022; Scherer et al. 2021). To make faculty more aware of the ever-changing knowledge, skills and abilities required of teaching professionals, it is essential for HEIs to offer professional development opportunities for their faculty (Ritzhaupt et al. 2018). In the Japanese HEI context, research conducted during the ongoing pandemic suggested that professional development be scaffolded to increase experienced faculty’s awareness of the potential for ICT to better facilitate the online teaching and learning experience
(Abe, et al. 2022). To take a first step in understanding the intersection of ICT and faculty, the focus of this study was to explore how instructors at a private Japanese HEI are currently using ICT, for what reasons they use ICT, and what barriers they perceive as influencing their use of ICT.

Literature review

Surveys of ICT use in Japanese HEIs

Three recent nationwide reports were found to include surveys about the use of ICT at HEIs in Japan—the 2006 Report on education Using ICT Including e-learning [National Institute of Multimedia Education (NIME) 2007]; a 2015 survey about the progress of governmental educational reforms in higher education by MEXT (2017); and a report on the status of ICT utilization in Japanese HEIs by the Academic eXchange for Information Environment and Strategy (AXIES) ICT Utilization Research Group (2016).

The NIME study (2007) looked at 5 areas: education using ICT, improved teaching through ICT, e-learning, distance learning through the Internet, and learning management systems (LMS). Responses from 915 HEIs and 1,880 different faculties revealed that the top reasons for HEIs to introduce education with ICT included providing students with effective education, providing efficient education, adapting to various learning environments, and providing high quality education. HEI’s main problems related to the implementation of ICT were lack of dedicated personal, a lack of teachers’ Technological Knowledge, and the resulting lack of Technological Pedagogical Knowledge. The same problems were cited by HEIs planning on implementing ICT. The need for faculty support was stressed in this report. As of this 2006 study, E-learning had been implemented in 56.7% of responding universities and by 34% of faculties. It was noted that LMS usage was dominated by “learning management functions”. Other main uses were for grading management, “report presentation functions”, and communication purposes.

The MEXT (2017) survey about the progress of governmental educational reforms in higher education had 627 universities as respondents. This report, which compared results to a study that had been conducted three years prior, showed an overall increase in ICT implementation for the purpose of education in each of the five broad categories that were part of the survey. The two categories that saw the greatest increase were the use of an LMS to promote learning, which had risen from 33.8 to 49.9%, and the usage of clickers, which rose from 20.6 to 35.6%. Aside from LMS adoption, the only other category to rise to over 40% of adoption by responding HEIs was in the use of e-learning to support independent learning and group work through a combination of online and face-to-face (blended learning) activities, which rose slightly from 36.3 to 44.0%.

The ICT utilization survey by the AXIES ICT Utilization Research Group (2016) was answered by a total of 1915 faculties from 516 Japanese four-year HEIs. One of the questions in this comprehensive survey asked respondents how often 21 different ICT tools/affordances were used. The five answer options were: “almost always
use,” “often use,” “hardly use,” “never use,” and “I don’t know.” Looking at just “almost always use” only two items reached double digits: PowerPoint at 50.5% and online tests/surveys at 13.9%. When including “only limited use”, only three items scored over 50% adoption: PowerPoint (92.0%), online materials (77.1%) and streaming videos (51.7%). Tools that could be used for community building (SNSs), collaboration (Dropbox/Google Docs) and content creation (Wikis/Blogs) were among the highest levels of “never use” and “don’t know,” with four of those items crossing 70%. In seeming confirmation of the reports on usage, the primary reasons for implementing ICT were for the purpose of dissemination of academic information and for support of out of class learning and self-study. Student/teacher communication (67.4%) and student/student communication (45.0%) were also identified as primary reasons for ICT adoption, yet these numbers were not reflected in the usage reports listed above.

**Barriers related to ICT integration in higher education**

Various barriers impede the adoption of ICT in education can be categorized as being either extrinsic to the teacher (first-order barriers) or intrinsic (second-order barriers) (Ertmer 1999). First-order barriers are relatively easy to identify because they are related to things like access and training. In a comprehensive review of barriers reported in the literature over a 10-year span, Hew and Brush (2007) identified 6 categories of barriers, four of which are considered first-order. The first is a lack of resources, which includes both access to technology and to training. Also included are the institution and its vision/integration plan, the subject culture of the area of study, and issues related to assessment of non-traditional work. The remaining two categories were identified as second-order barriers. These are the attitudes and beliefs regarding teaching and learning and the knowledge and skills of the teachers. While first-order barriers can be mitigated through policy and resources, second-order barriers can be more difficult to overcome because they “confront fundamental beliefs about current practice” (Ertmer 1999, p. 48) and are therefore “less tangible, more personal, and more deeply ingrained” (Wilson et al. 2020, p. 3).

The effective use of technology in education is a combination of both “technical and social elements” (Papanastasiou and Angeli 2008, p.70). Latchem et al., (2008) say that in the case of Japan, if “government reforms were pictured as two hands, the right one would be avidly promoting ICT, while the left would be simultaneously blocking it” (p. 617) and cite a lack of support available to teachers. From an institutional perspective, Aoki (2010) believes the Japanese HEIs are failing to make use of ICT in education because there is little “pedagogical innovation in educational institutions in Japan to take advantage of the technologies” (p. 858).

Nakayama and Santiago (2004) feel that there is a cultural barrier to the adoption of e-learning, with Japanese having a preference “for traditional educational methods, including measuring learning through examinations or mastery of classical information” (p. 101) which involve memory more than reasoning. Funamori (2017) echoes the same observation, adding that the purpose of class is for teachers to achieve their goals, so ICT use is generally restricted to students
doing what the teacher tells them to do. Funamori (2017) also notes that ICT is rarely used as a communication tool between teachers and students. This all reflects the situation where “the use of ICT in education has been promoted without much consideration to pedagogical issues and the use of ICT has become the end itself, not the mean to achieve more effective teaching and learning” (Aoki 2010, p. 858).

Research questions

The purpose of this study was to examine the ICT use of faculty members at a private Japanese HEI, with the larger goal of informing future professional development offerings. The following research questions were addressed:

1. What specific technologies do the faculty members of a single private Japanese HEI use in their teaching?
2. For what reasons do these faculty members use ICT in their teaching?
3. What are these faculty members’ perceived barriers to ICT usage?

Methodology

Instrument

The data used in this study came from the first four parts of a five-part survey containing 92 items in 30 questions. The first section focused on demographics while the second focused on the ICT tools used by instructors and their students. This second section was modeled on previous national surveys and contained yes/no items asking about ICT use (Academic eXchange for Information Environment and Strategy (AXIES) ICT Utilization Research Group 2016; Kyoto University 2014). The third section had participants rank reasons for ICT use on a 5-point scale of importance adapted from the USEIT Teacher Survey (Technology and Assessment Study Collaborative 2003). The fourth section contained questions about barriers and was adapted from Hutchison and Reinking’s (2011) survey of barriers to ICT integration using a 5-point scale of importance ranging from “not important” to “very important.” The final part of the complete survey, the results of which are beyond the scope of these research questions, posed a series of questions regarding the perceptions of teachers’ roles and responsibilities.

Once finalized in English, the survey was translated into Japanese. Two native-Japanese speaking HEI faculty then reviewed the Japanese version of the survey to make any necessary changes if items were unclear. Once finalized, the Japanese version was translated back into English by a professional Japanese to English translator. The back-translated items were then compared to the original English
to confirm that the meanings of the items remained true. Explained in more detail below, all scales had acceptable levels of alpha (Tavakol and Dennick 2011).

**Data collection and analysis**

After receiving IRB approval, a link to the anonymous online survey was emailed to all full-time faculty members at a private Japanese HEI \((n=170)\) located in the Kansai area of Japan. The link remained active for a period of 3 weeks, and reminder emails were sent at one-week intervals. A total of 86 people (50.58%) clicked through the informed consent page and 85 responded to the items in the survey. 74.12% were male, with 42.36% of participants over 51 years of age and another 40% over 41 years of age. Four areas of specialization accounted for 51.58% of the participants: psychology (16.86%), economics (14.25%), literature (10.84%), and sociology (9.63%). The fifth most common field was engineering at 3.61%. Twelve fields accounted for 2.40% each, while the remaining 13 accounted for 1.20% each. Complete details of these demographic categories are listed in Online Appendix A. Excel Version 16.28 and SPSS Statistics Version 26, both for the Macintosh computing platform, were used to conduct statistical descriptive analysis.

**Results**

**Use of technology in teaching**

Participants were asked about specific technologies and their knowledge regarding some of those technologies. The focus of some questions was based on ICT infrastructure known to be in place at this HEI.

WebClass is the learning management system used by this HEI. While this LMS has been in place for several years, faculty are not required to use this system with their classes, even though all classes can be found within the LMS. Individual faculty are responsible for uploading their own content. Participants were asked what features of WebClass they used (Table 1). Within this question, there were 14 discrete items. Depending on the item, the number of responses varied from 79 to 58. Table 2 shows that ICT was primarily used for content distribution while more creative and collaborative functions were used little to not at all. Participants were asked about the ICT they used during a typical 90-min class. This question was composed of 25 items. Complete results are listed in Table 2.

When it came to internet information resources and digital media, 52.78% \((n=72)\) of faculty made use of YouTube videos. Web pages discovered through search were used by 51.61% \((n=62)\) of faculty. Faculty-made webpages were relatively uncommon, with only 3.45% \((n=58)\) of faculty reporting regular usage. Audio files were used by 20.00% of faculty \((n=60)\) while e-books were used in class by 15.00% \((n=60)\) of respondents.
As for the communication and collaboration affordances available through ICT, the LMS, WebClass, was the most used tool, with 82.86% (n = 70) of faculty indicating its use in class. Email was the most common form of communication with 60.61% (n = 66). Twitter and Facebook were used minimally by faculty: 1.69% (n = 59) and 4.92% (n = 61), respectively. There was zero use of video conferencing tools. File sharing tools such as Dropbox or OneDrive saw usage by 25.00% of faculty (n = 60).

### Reasons for ICT integration

Participants were asked about their perceived importance of various elements that led to their integration of ICT in their teaching. The Cronbach’s alpha for this subsection was 0.965, indicating a high degree of internal consistency. The summary mean of all items in this section was 3.329.

The items most important to the responding participants were “preparing students for future jobs” and “improving student computer skills and abilities,” which both had means of 3.70 (SD = 1.134). “Using technology to improve classroom instruction” was ranked seventh, with a mean of 3.26 (SD = 1.236). “Teaming and collaboration” was ranked eighth with a mean of 3.23 (SD = 1.342). On the low end of this scale of importance were “promoting active learning strategies” at the eleventh spot with a mean of 3.13 (SD = 1.361) and “using technology to improve student performance” at the thirteenth spot with a mean of 2.97 (SD = 1.285). Full results can be seen in Table 3.

### Table 1  Did you use the following LMS features last semester?

| LMS feature                        | Yes % (n) | No % (n) | Total n |
|------------------------------------|-----------|----------|---------|
| Textbook creation                  | 88.61 (70)| 11.39 (9)| 79      |
| Essay assignment for file submission | 84.81 (67)| 15.19 (12)| 79     |
| Email to individual students       | 81.08 (60)| 18.92 (14)| 74     |
| Feedback to students               | 66.20 (47)| 33.80 (24)| 71     |
| Email to entire class              | 55.88 (38)| 44.12 (30)| 68     |
| Grade management                   | 55.22 (37)| 44.78 (30)| 67     |
| Tests                              | 43.94 (29)| 56.06 (37)| 66     |
| Surveys                            | 36.51 (23)| 63.49 (40)| 63     |
| Chat                               | 36.51 (23)| 63.49 (40)| 63     |
| BBS                                | 19.35 (12)| 80.65 (50)| 62     |
| e-portfolio container              | 11.86 (7) | 88.14 (52)| 59     |
| Study Card creation                | 10.34 (6) | 89.66 (52)| 58     |
| Unit creation                      | 6.9 (4)   | 93.10 (54)| 58     |
| Wiki                               | 0 (0)     | 100.00 (58)| 58     |
When given the chance to provide other reasons the participants considered important to their adoption of ICT in their teaching, 16 of the 20 responses could be divided into two basic categories: benefits to the instructor and changes in society. Benefits to the instructor included making preparation for class easier and the benefit of anytime/anywhere connectivity. Changes to society included recognizing the “age of technology,” changes in how students access information, and the immediacy and accuracy of being able to find and share new information. Two participants listed university expectations and oversight as their important reasons for using ICT. One participant mentioned cost/benefit performance. The one remaining response simply stated “learning.” Items listing general benefits to the teacher were highly ranked in the scale of importance of the previous question.

| Table 2 | Faculty ICT usage during 90-min class periods |
|---------|-----------------------------------------------|
| Were the following items regularly used by you during class? | Yes | No | Total |
| | % (n) | % (n) | n |
| PowerPoint | 89.74 (70) | 10.26 (8) | 78 |
| WebClass | 82.86 (58) | 17.14 (12) | 70 |
| MS Word | 75.00 (51) | 25.00 (17) | 68 |
| Teacher’s classroom computer | 74.32 (55) | 25.68 (19) | 74 |
| Personal computer | 68.92 (51) | 31.08 (23) | 74 |
| Email | 60.61 (40) | 39.39 (26) | 66 |
| MS Excel | 55.38 (36) | 44.62 (29) | 65 |
| YouTube videos | 52.78 (38) | 47.22 (34) | 72 |
| Third party web pages discovered through a search engine (not Wikipedia) | 51.61 (32) | 48.39 (30) | 62 |
| LINE | 38.10 (24) | 61.90 (39) | 63 |
| File sharing tools (Dropbox, OneDrive, etc.) | 25.00 (15) | 75.00 (45) | 60 |
| Smartphone/Tablet apps | 22.03 (13) | 77.97 (46) | 59 |
| Personal smartphone/tablet | 20.69 (12) | 79.31 (46) | 58 |
| Audio files | 20.00 (12) | 80.00 (48) | 60 |
| Wikipedia | 19.35 (12) | 80.65 (50) | 62 |
| e-books | 15.00 (9) | 85.00 (51) | 60 |
| Online tests/quizzes (not WebClass) | 10.00 (6) | 90.00 (54) | 60 |
| Hypertext links or QR codes created by teacher | 8.62 (5) | 91.38 (53) | 58 |
| Online surveys (not WebClass) | 6.78 (4) | 93.22 (55) | 59 |
| Facebook | 4.92 (3) | 95.08 (58) | 61 |
| Teacher-made web pages | 3.45 (2) | 96.55 (56) | 58 |
| Video editing software | 3.33 (2) | 96.67 (58) | 59 |
| Twitter | 1.69 (1) | 98.31 (58) | 59 |
| HTML editing software | 0.00 (0) | 100.00 (59) | 59 |
| Video Conferencing (Skype) | 0.00 (0) | 100.00 (59) | 59 |
Obstacles to ICT integration

The survey listed 22 obstacles that had been previously identified in the literature as potential obstacles to the integration of ICT in teaching. The summary mean of all items in this section was 2.71. Cronbach’s alpha for this section was 0.950.

The lowest mean of any of the items was 1.97, indicating an overall perception that all the items listed in this section are perceived obstacles to ICT integration among these faculty members. The most strongly identified obstacles were a lack of technical support ($M=3.22$), not knowing how to use technology ($M=3.13$), and a lack of professional development on integrating technology ($M=3.08$). A lack of incentives to use technology ($M=3.00$) and lack of support from administrators ($M=2.98$) were the next biggest obstacles. Table 4 shows the means and standard deviations of all 22 items in descending order.

This section of the survey ended with an open-ended question asking about any additional obstacles to the integration of ICT in instruction. Of the 15 responses, five participants wrote “none.” One participant wrote that the use of ICT for education requires a new way of thinking while two wrote that the current educational style has been established and proven sufficient. One participant wrote that ICT was difficult to use because it was difficult to fit in with the course content, but then went on to give an example of bookkeeping, where, this participant wrote, it is necessary to use a calculator and write the calculated results down on paper. Another wrote that based on the content of the course, ICT was unnecessary. Two participants referred to attitude, with one being the teacher’s desire to improve class and the other referring to student indifference and lack of knowledge. Other responses referred to the university infrastructure, where either the equipment was not in place for immediate use or changing...
software versions made some ICT difficult to use. One participant questioned the premise that ICT should be used.

**Discussion**

This research was conducted shortly before the COVID-19 pandemic disrupted teaching and learning all over the world. As the pandemic began impacting Japan, all classes were changed to either synchronous or asynchronous online modalities. It is likely that faculty at the private HEI in this study were forced to use other technologies in their teaching during the pandemic. However, this research looked beyond their use of ICT for teaching, and also explored their reasons for ICT use and perceived barriers to that use. These findings can inform on plans

| Potential obstacles (n)                                                                 | Mean  | SD   |
|----------------------------------------------------------------------------------------|-------|------|
| Lack of technical support (72)                                                        | 3.22  | 0.878|
| I don’t know how to use technology (71)                                                 | 3.13  | 0.974|
| Lack of professional development on how to incorporate technology (72)                  | 3.08  | 0.872|
| Lack of incentives to use technology (72)                                               | 3.00  | 1.038|
| Lack of funding (70)                                                                    | 3.00  | 1.065|
| Lack of support from administrators (71)                                                | 2.98  | 0.920|
| I don’t have time to teach students the basic computer skills needed for more complex tasks (74) | 2.97  | 0.942|
| I don’t think I have enough time to prepare for using technology (72)                   | 2.90  | 1.167|
| I don’t understand how to integrate technology into my instruction (71)                 | 2.90  | 1.060|
| Lack of access to technology (71)                                                       | 2.88  | 1.031|
| I don’t understand copyright issues (76)                                                | 2.79  | 1.045|
| I don’t know how to incorporate technology and still teach content (70)                 | 2.78  | 0.924|
| I don’t believe technology integration is useful (70)                                   | 2.73  | 1.224|
| I don’t know how skilled my students are at using technology (75)                       | 2.67  | 0.960|
| I don’t think technology fits my beliefs about student learning (71)                    | 2.67  | 1.090|
| I don’t think technology is reliable (70)                                               | 2.66  | 1.032|
| I have difficulty controlling what information students access online (75)              | 2.56  | 1.054|
| Lack of time during a class period (71)                                                 | 2.56  | 1.025|
| I don’t think I have time to integrate technology because of the amount of time required to prepare students for tests (71) | 2.53  | 1.127|
| I don’t know how to evaluate or assess students when they work online (74)              | 2.39  | 0.981|
| I have difficulty managing the classroom when students are working on computers (74)   | 2.36  | 1.076|
| I think internet text is too difficult for students to read (75)                        | 1.97  | 1.015|
for long-term integration of technology and professional development at that HEI and other HEIs in Japan.

**ICT tools used by faculty members**

Only eight of the 25 technologies listed in the survey were regularly used by more than 50% of the respondents (Table 2). ICT use was mainly confined to computers as opposed to mobile devices, and software such as MS PowerPoint and Word. Almost 90% of the participants indicated regular use of PowerPoint in classes. Mobile technology was used by 21% of the responding faculty. Newer forms of digital media such as e-books and audio files were rarely used. Collaborative tools and SNS interaction were infrequently used.

WebClass (the LMS) was regularly used in class by 83% of the participants. However, WebClass was mainly used for three purposes: the posting of materials for students (89%), the collection of digital assignments (85%), and email to individual students (81%). More collaborative and communicative affordances of the LMS such as chats (37%) and a BBS (19%) were used rarely, and in the case of wikis, they were not used at all (Table 1).

When it came to LMS usage for the posting of materials and the collection of homework, results from these individual faculty members at this HEI were slightly higher than the institutional results from the study by the National Institute of Multimedia Education (2007) conducted more than a decade earlier. Not using an LMS to its full potential is not an unusual occurrence. As found in this study, LMSs are often used as a document repository while more communicative and collaborative functions remain unused (Fathema et al. 2015). In a study that looked at how beliefs and attitudes impacted the non-mandatory use of LMSs in HEIs, Fathema et al. (2015) surveyed 560 individuals who were teaching at two different universities in the United States. The resulting data showed that system quality was a statistically significant variable affecting levels of perceived usefulness, attitudes towards use, and perceived ease of use of an LMS. In their study, system quality (SQ) was defined as “the quality related to the functions, speed, features, contents, [sic] interaction capability of [sic] LMS” (p. 213).

While an argument could be made that these results, collected pre-pandemic, are no longer an accurate reflection of ICT use, a study conducted at an unnamed Japanese university after a full semester of pandemic response-online teaching found similar, though not as detailed results. Abe, et al. (2022), recorded responses from more than 2000 HEI faculty regarding 6 facets of ICT usage. On a five-point Likert scale ranging from “not applicable” to “very applicable”, the use of ICT to collect information was the highest ranked item, with an average score of 3.5, followed closely by a perceived ability to create documents and disseminate information using ICT scored 3.4. The lowest ranked item, scoring 2.9, was regarding the use of ICT to encourage collaborative learning and meaningful discussion between students. These results indicate similar trends to those seen in this study.
Reasons for ICT use in teaching

The use of ICT can enhance both teacher-centered and student-centered classrooms. The former benefit from an enrichment of presentation and other teaching materials and the latter from providing students with opportunities to explore and take charge of their own learning. However, with these faculty, reasons for ICT integration were less about learning and more about a professional obligation to prepare students for their entry into adult society convenience and on their own convenience. The two items with the highest mean scores were preparing students for future jobs and improving students’ computer skills and abilities. As most professions the students will vie for likely require some use of computers, it is easy to see the connection between these two items.

The third and fourth highest ranked items were about improving teacher proficiency and productivity. Using technology to improve instruction was ranked 7th while promoting active learning strategies and improving student performance were ranked 11th and 13th, respectively. Though all items on this scale were considered relatively important, the primacy of job preparation over improving student performance and that of improving teacher efficiency over improving teaching practice are consistent with what was reported in the literature regarding Japanese higher education (Aoki 2010; Latchem et al. 2008; Newby et al. 2009).

Improving student performance and promoting active learning strategies were at the bottom of the list, even being considered less important than supporting instructional reform. This is despite the fact that for the last several years at this HEI, “active learning” has been stressed by administration as one way to improve learning outcomes at this institution.

A changing society was mentioned by several participants in the open-ended question. Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, and Sendurur (2012) identified teacher recognition of a “change in students” (p. 432) as a strong reason for ICT integration. They found that teachers who recognized this change reflected more on their practice and became more “committed to finding ways to prepare their students for the future by leveraging the technology, including Web 2.0 tools, students were already using in their personal lives” (p. 432).

Kirkwood and Price (2014) describe the Higher Education Funding Council for England as listing three potential types of benefits to technology-enhanced learning (TEL): efficiency, enhancement, and transformation. Efficiency is related to carrying out current practice “in a more cost-effective, time-effective, sustainable or scalable manner” (p. 4). Enhancement is an improvement on “existing processes and the outcomes” (p. 4). And transformation is a “radical, positive change in existing processes or introducing new processes” (p. 4). Learning is not specifically mentioned in association with these three benefits. With these distinctions in mind, the primary reasons for adoption of ICT by the faculty at this HEI seem to fall under these descriptions of efficiency and enhancement, only that the enhancement is focused less on the students and more on the faculty. Teaching efficiency was something that the literature described as a characteristic of teacher-centered instruction (Tam 2000).
Perceived barriers to ICT use by faculty

In their original study, Hutchison and Reinking (2011) were pleased to find that 13 items in their list of 22 barriers had means of less than 2.00, suggesting that such encouraging results “may suggest progress in light of previous findings” (p. 325). With this study, there is no evidence of continued progress, as all but one of the items had means greater than 2.00, with the 22nd item having a mean of 1.97. However, perhaps some encouragement can be found in the result that the items perceived as the greatest obstacles those that fall under what Ertmer (1999) termed first-order barriers: barriers that are external to the intended user of ICT. Of these nine items, six of them could be classified as such, with “lack of technical support” being the most heavily felt. Referring back to Hew and Brush’s (2007) four first-order categories, the primary perceptions were a lack of resources, both in terms of access and of support, and barriers related to the institution where the study took place. Of the three second-order barriers in this list, which refer to barriers that are internal to the intended user, all of them could be mitigated by addressing the first-order barriers already listed. If the institution offered more technical support and more professional development on how to integrate technology, then the faculty would better understand how to use technology and how to integrate it into their instruction.

As all participants to this study were teaching faculty, a surprising result was in the items that had the highest percentages of “not applicable” as the chosen answer. The range of percentages for this response were from 5.56% to 22.54%. Of the 22 items, the following three items had the highest percentages of “not applicable”:

1. I don’t think technology fits my beliefs about student learning. (22.54%)
2. I don’t believe technology integration is useful. (21.43%)
3. I don’t think technology is reliable. (20%)

Initial pedagogical strategies are often based on individual epistemological worldviews (Ertmer and Newby 2013; Schraw and Olafson 2002) and experiences gained while a student (Angers and Machtmes 2005; Bai and Ertmer 2008). For the item, “I don’t think technology fits my beliefs about student learning,” almost 23% of the participants selected “not applicable.” If participants’ conceptions of teaching are based solely on the actions carried out by the teacher, it might seem possible to formulate a teaching plan without basing the lesson on some ideas of how students learn. And if their conceptions of teaching are based on their own experiences as students, it should be remembered that 40% of these participants were between 41 and 50 years of age, while another 42% were older still, likely indicating that more than 80% of the participants were taught at a time before ICT was commonplace in the classroom. Assuming that these participants realized that the 5th answer option was “not applicable” and not the highest ranking for an obstacle on this scale, then it seems that nearly a quarter of them have never really processed their beliefs about student learning as it relates to the actions of
the teacher, or that they have, and perceived technology to be completely antithetical to those beliefs. However, the response to this item makes more sense when looking at it in relation to the relatively low level of importance student learning had in the reasons for ICT integration as discussed in the previous section. This is possibly an indication that ICT is just not perceived as being related to learning. As for the matter of technology integration, perhaps no experience with attempted integration leads to the not applicable answer choice. An assessment of the reliability of technology might also be hard to make without experience with its use.

In the open-ended question related to obstacles, there were 10 responses. Two of them could be considered first-order barriers while the rest were second-order. While a lack of technological knowledge was acknowledged, the greatest barriers seemed to be those of attitude regarding ICT. While this could be due to faculty perceptions of ICT, it could also be an overall resistance to forced change.

As for other obstacles, several of the entries seemed to relate to Japanese cultural attitudes discovered in the literature. Latchem et al. (2008) wrote about students in Japan having little desire to study. As for teachers, a study conducted in 2011–2012 found that 45% of Japanese HEI faculty felt their students to be of poor quality while another 45% ranked them just one step higher on the four-point scale, at fair (Huang 2017). These perceptions of students seemed to be mirrored by one participant of this study who listed student indifference and lack of knowledge as an obstacle. Another entry referred to the teacher’s desire to improve class as an obstacle, perhaps reflecting what previous literature has said about the quality of higher education in Japan and the relatively low level of investment made by faculty in trying to teach well (Latchem et al. 2008; Newby et al. 2009). Teaching well takes time, but a lack of time has been cited as a barrier in numerous studies (Ertmer et al. 2012; Liu 2011; Ulrich and Karvonen 2011). At the time this study was conducted, it was possible that many faculty members at this HEI had full teaching schedules and other institutional obligations, leaving little time or energy leftover to devote to adapting classes to evolving ideas regarding teaching and learning. With the onset of the pandemic and the necessity to rely solely on ICT to both teach classes and evaluate students, the problems of lack of time and increased responsibilities were most likely exacerbated (Jung and Choi 2022; Marek et al. 2021).

Implications

The present study is significant because, though conducted at a single institution, it provides insight about an issue that has been observed in HEIs throughout Japan: a lack of innovation in higher education despite government directives and a large ICT infrastructure. Regarding ICT integration, the results from this study are similar to those of the MEXT report of 2017 and Abe et al. (2022). Concurrently, the most prominent perceptions regarding ICT and education identified in this study reflect the continuation of cultural attitudes and professional practices identified years earlier (Aoki 2010; Nakayama and Santiago 2004). Put together, these results lead to the conclusion that for professional development to be successful in achieving the goals of Japanese higher
education in the twenty-first century, perceptions of the purpose of higher education and the role faculty plays in achieving that purpose need to be a focal point of any program that will help faculty become aware of the potential benefits of ICT.

Limitations

In this non-experimental survey research, there were inherent limitations. The use of a survey presumes self-reported data, there were no classroom observations to triangulate how technology was actually being used.

Roughly 50% of the entire population started the survey, so data from the other 50%, a different sample, could drastically change the how the research questions were answered. Due to the demographic imbalance between male and female participants and the abundance of participants with backgrounds in psychology and economics (a combined 31.3% of all participants), between-groups statistical analyses were not conducted. Had there been a more even distribution among participant demographics, it is possible that the results and their implications would have been different.

Language and culture must be considered limitations. Native Japanese translated and proofread the final instrument and a back-translation by a third party proved true to the original, but it is still possible that some items were not read in the manner in which they were intended. Responses to open-ended questions were also translated, and it is possible that there may be other interpretations intended by the participants.

Recommendations for future research

Results from this study point to several areas that would benefit from further research. First and foremost, a qualitative follow-up to this quantitative study could yield a richer picture of how ICT is being used and why decisions regarding that use are made. Following the COVID-19 pandemic, it would also be useful to investigate the current situation with these educators to determine if the forced use of ICT required by teaching fully online classes led them to use ICT in new ways. In addition, it would be useful to investigate if the overall perceived barriers to ICT use have changed due to time spent teaching online. Another area that would benefit from future research is in that of the university’s perceived role in providing professional development. Presently, this HEI has no dedicated support staff to help faculty integrate ICT with education. If such “human-ware” (Zhang 2007) was present, would faculty take advantage of it? What kind of support do faculty members want the university to provide? What are the motivations, decisions, and limitations behind the professional development that the university does provide?

Conclusion

The purpose of this study was to take a first step that would inform on developing a program of professional development that will prove the most beneficial to the faculty at this HEI. This step included learning about the ICT currently used by faculty,
reasons for and obstacles to that use. It is widely recognized that Japanese HEIs need to improve the quality of education they provide their students. The presence of ICT does not transform teaching. Teachers do. But for faculty at Japanese HEIs to do so, they need to be made aware their role in this transformation. The COVID-19 pandemic forced faculty to depend on ICT in order to continue teaching without being able to meet their students face-to-face. Now that an obvious need for ICT integration has materialized, it is only through an expanded knowledge of practice and pedagogy, and in the ways that each can transform the other, that faculty will be better able use ICT to introduce students to a new way of learning, and thus, better prepare them to successfully address the needs of society in the twenty-first century. If current perceptions could be reclassified, perhaps faculty would more easily see the potential for ICT to transform the way students learn.

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Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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