Survey on the Use of Computers and the Internet in Japanese Classes in the United States

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Technology, especially the Internet, has advanced significantly in the last decade. Consequently, the wide spread use of the Internet in schools has been documented: In the United States, 87% of public schools have access to the Internet as of 2001. This advancement of and high accessibility to technology has encouraged technology use in foreign language education in the United States. The Japanese teaching field is assumed to be no exception, but in reality how much do Japanese teachers use computers for instructional purposes? To understand the current situation, a survey study was conducted involving practicing Japanese teachers in the United States.

The survey questions addressed three areas: 1) the teacher's environment for computing and Japanese capability, including technical support, 2) the availability of computers at school for class use, and 3) technology-related projects completed in class. The questionnaire was distributed in April 2002 to 500 teachers who were randomly selected from two national organizations of Japanese teachers in the United States. 243 responses were analyzed and compared among three different groups according to the school levels that the participants teach: elementary, middle/high, and post-secondary.

The results revealed that most teachers have exclusive access to computers with a tendency for post-secondary school teachers to use newer operating systems than elementary and middle/high school teachers. It was also found that many participating Japanese teachers lack technical support for Japanese software at their institutions. Nevertheless, the findings show that many teachers actively utilize the Internet in teaching. To further support Japanese teachers in their endeavor to take advantage of technology, more attention

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should be paid to its pedagogically sound implementation, as recent advances in multilingual computing have made Japanese capability less problematic than before.

INTRODUCTION

The advancement of computer technologies has changed our daily lives significantly in the past decade. The Internet in particular has become an essential tool for a variety of activities, such as searching for information, communicating with others, and publishing materials. As of the year 2000, 51% of the households in the U. S. owned at least one computer, and 42% of them had Internet access at home (U.S. Census Bureau 2001). At school, as well, there has been an increase in computer and Internet use: According to a survey conducted by the National Center for Education Statistics (NCES) in 2001, 87% of public schools in the U.S. have access to the Internet for instructional purposes, a dramatic jump from 3% in 1994 (NCES 2002).

As the Internet has come into wide use, professionals in foreign language education have recognized the educational value of the Internet in their work. Phillips (1998) asserts that technology can benefit foreign language learners in areas such as access and authenticity. For example, e-mail allows access to other speakers of the target language and thereby interact cross culturally. The Web offers ample authentic materials that can be used for interdisciplinary learning and personal enjoyment (Walz 1998).

Although more and more foreign language teachers take advantage of the Internet, some may face technical difficulties associated with multilingual computing particularly in non-alphabet languages (Gonglewski 1999, Netsu 1999). The recent development of computer technologies has made it easier for teachers and learners of non-alphabet languages to use the Internet. Thus, it is reasonable to assume that foreign language teachers are now ready to utilize this resource. To confirm the validity of this assumption, a survey study was conducted involving teachers of a non-alphabet language: Japanese.[1]

This article reports the findings of a survey conducted in the U.S. The first section reviews the existing literature concerning Japanese capability in English operating systems, support and training issues, and Internet use in foreign language education. The second section outlines the present study, which looks into the environment for computing in Japanese language teaching. Then, the results are presented and discussed in an attempt to understand the current situation and the computing needs of Japanese teachers.

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[1] The preliminary results of the national survey were presented at the annual meeting of the American Council on the Teaching of Foreign Languages (ACTFL) in Salt Lake City, Utah, on November 22, 2002.

LITERATURE REVIEW

1 Japanese Capability in English Operating Systems

For a long time, non-alphabet languages such as Japanese created script problems and thus compatibility problems (Harrison 1998). Finally in 1993, Apple started to sell the Japanese Language Kit, which enabled Japanese displays and input in English operating systems. For Windows users to use Japanese, they needed to purchase the Japanese version of Windows or turn to third-party software such as Kanjikit or UnionWays.

In 1999, Microsoft followed Apple and introduced a free downloadable input method editor called Global IME[2] that enabled Windows 95, 98 and NT to read and write Japanese. Windows Me was released in September 2000, and Global IME worked in the same way as the previously mentioned operating systems. However, it was developed only to allow Japanese input with limited Microsoft applications (Microsoft Corporation 1999).[3] Moreover, users needed to correctly install and configure additional components in their computers in order to gain full advantage of the bundled components, which could be a difficult procedure.

Since the introduction of Macintosh OS 9 and Windows 2000, users have not had to purchase Japanese fonts and input method editors separately, and it has become much easier for users to view Japanese on English operating systems. However, newer operating systems, i.e., Macintosh OS X and Windows 2000 and XP, are based on a new encoding system called Unicode, which may create additional compatibility problems between the new and old systems when displaying Japanese scripts. To resolve the compatibility issues involved in multilingual computing, Unicode has been created as an attempt to set a new standardized encoding system that displays multiple non-Roman languages without fail. However, older operating systems may not be able to handle Unicode, and even those with Unicode capabilities may not be able to decode Unicode-encoded documents when these are used with the older software. Both the operating system and software must be able to handle Unicode in order to take full advantage of this multilingual encoding system. Even exchanging e-mail can be a problem between users with and without a Unicode-capable environment.

2 Support and Training: Technological and Educational

As the benefits of computers and the Internet have become recognized, more and more foreign language teachers have made use of the Internet in their classrooms. During the infancy of computer technology and the Internet use in foreign language

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[2] More information about Global IME is available at http://www.microsoft.com/windows/ie/downloads/recommended/ime/default.mspx

[3] Global IME was developed to work with only latest versions of Microsoft Word, Internet Explorer, Outlook, and Outlook Express. However, it can be used with some non-Microsoft applications. For example, Global IME supports Netscape Communicator with some limitations. Information on this can be found at http://wp.netscape.com/eng/intl/gimesupport.html

education, Cotton (1995) pointed out three key issues that would affect the successful implementation of technology into instruction: the faculty's comfort level with computers, access and ownership of computers, and access to technical and instructional support resources. These claims are supported by studies that examined reasons for use and non-use of technology in foreign language classrooms (Lam 2000, McKay and Robinson 1997). Lam (2000) and McKay and Robinson (1997) found that while language teachers acknowledged the positive effects of computer technology, certain issues such as limited facilities, time, or the teachers' lack of knowledge of and confidence in computers, and their skepticism about technology prevented them from utilizing computer technologies.

In the case of Japanese language teaching, the problem of non-Roman scripts also needs to be considered. As mentioned above, Japanese scripts present more of a technical challenge than do alphabetic languages. Netsu's (1999) survey revealed that Japanese teachers faced technical obstacles. Netsu surveyed primary and secondary school teachers of Japanese in Australia and found that approximately 90% of the 332 teachers who responded used the Internet, but only 30% used the Internet in Japanese. Although this survey was not conducted in the U.S., his findings are relevant because Australia is another country where operating systems are configured primarily for English-only use. The respondents named technical problems resulting from Japanese scripts as one of the major reasons for not using the Internet in Japanese. Netsu (1999) thus implies that there is a need for institutions to provide a support system to teachers encountering Japanese-related technical problems with English operating systems.

Equally important is for teachers to collaborate with their Information Technology (IT) departments to further knowledge of multilingual computing and the pedagogical use of technology. For instance, to conduct an e-mail exchange project between college students of Japanese in the U.S. and college students of English in Japan, Uehara (1997) had to ask his students to write to the IT department requesting an increase in the number of Japanese-capable computers. For a project that carried 10% of class grading, eighteen students had to share one computer. Having the IT department understand the multilingual computing needs of teachers and students and making technology projects a reality is a necessary part of technology implementation.

One study indicates the possible benefit of training support for promoting computer use in foreign language classrooms. In a state-level survey study, Moore, Morales, and Carel (1998) investigated the extent to which elementary, middle, and high school foreign language teachers in Texas utilized technologies to teach culture. A noteworthy finding was that Japanese teachers used advanced technologies, such as CD-ROMs and the World Wide Web (Web), more than other foreign language teachers. The authors speculated that the Japanese teachers' relatively active use of advanced technology might be due to training. That is, they might have learned how to use a Bulletin Board System (BBS) during a state-level professional development program and then later transferred these skills to their own classroom. The authors conclude that it is necessary to provide foreign

language teachers with training programs in which they can learn instructional technology and how to effectively use it in the classroom.

3 Internet Enhancement in Foreign Language Education

The expansion of the Internet has drawn the attention of educators, including foreign language teachers. Foreign language teachers are particularly attracted by the Internet's potential as a resource for authentic materials and as a communication tool. Indeed, Chun and Plass (2000, 161) attribute high expectations of networked computers such as the Internet to "the universal availability of authentic materials" and "communication capabilities through networking."

Previous studies support this claim. For example, in Osuna and Meskill's (1998) study, 13 college students of Spanish participated in Web-based activities that integrated language and culture. The students were given five tasks that required them to use the Web as a resource. The analysis of post-activity questionnaires revealed that more than two thirds of the students claimed increased knowledge of language and culture through the Web-based activities. Furthermore, all students indicated that they valued the Web as a tool for learning.

Kern's (1998) and Hertel's (2003) reports on e-mail exchange projects also indicate that the Internet, and its communication capability in particular, can enhance foreign language learning. Kern (1998) implemented an e-mail exchange project between a group of students in France and college, novice-level French learners in the U.S. In the exchanges, the students discussed the French students' family stories that the U.S. students read in class. Based on this experience, Kern argues that e-mail enables cost-effective, rapid communication with native speakers of the target language, which gives learners opportunities to learn the target language through social dialogues as well as to be engaged in intercultural learning beyond that offered by traditional materials. Furthermore, in Hertel's (2003) study, first-year, college Spanish students in the U.S. corresponded with college students learning English in Mexico. Although they primarily used English, the comparison between the pre- and post-surveys shows that the students became more open to Mexican culture and more critical about their own after they participated in the e-mail exchange project.

These advantages of the Internet are believed to bring yet another important benefit to foreign language education in the U.S.: The Internet may help to address the *Standards for Foreign Language Learning* (National Standards in Foreign Language Education Project, 1996). The *Standards* have set national goals in five goal areas (Communication, Cultures, Connections, Comparisons, and Communities), thereby defining the target levels of knowledge and ability for foreign language learning in the U.S. Foreign language educators have strived to comply with these goals. Gonglewski (1999) argues that the Internet enables learners to explore other languages and cultures and compare them with their own language and culture. Learners can also participate in a community where life-long learning is possible. These benefits correspond to the five goal areas of the *Standards*, and Fukai's (2004) study on an Internet-based newspaper project ties in with Gonglewski's argument

by providing evidence that the Internet could indeed help learners achieve the objectives advocated by the *Standards*.

In sum, existing research has already established the benefits of using the Internet for foreign language learning. Nevertheless, foreign language teachers appear hesitant to utilize the Internet for reasons such as technical difficulties and lack of support and training. As technology advances, however, the teachers' computing environment is likely to change. Improvements in multilingual support may encourage teachers of non-alphabetic languages such as Japanese to implement more computer-based activities in their classrooms. Does this assumption hold? To answer this question and describe the current situation of computing in Japanese language education, we conducted a descriptive study in the United States by means of a questionnaire.

BACKGROUND OF THE STUDY

1 Participants

The participants of this study were Japanese teachers in the United States. The sample was taken from two national organizations, The Association of Teachers of Japanese (ATJ) and The National Council on Japanese Language Teachers (NCJLT). ATJ consists mainly of university-level instructors, whereas most members of NCJLT have traditionally been secondary-level teachers.

At the time of the study, ATJ had 487 members, while NCJLT had 898. After taking account of members who belonged to both organizations, we obtained 1162 as our base pool for sampling. From 1162, 500 teachers were randomly selected as the targets for the questionnaire of the present study.

2 Procedures

The present study employed a one-page questionnaire in two languages (English and Japanese) so that participants could use the language they preferred. The original questionnaire was developed based on Netsu's model (1999) and piloted in a study involving Japanese teachers in Northern California (Omoto, Fukai, and Schneider 2002). Based on the results of the pilot study, items on the questionnaire were slightly modified. For example, choices for answers to questions about technical support sources and computer-enhanced projects were reworded and added. In addition, "Windows XP" was added as a choice of operating systems since it was released after the pilot study.

The questionnaires were distributed with a cover letter in English and Japanese to 500 teachers by the U.S. Postal Service in April 2002, and recipients were asked to return either the Japanese or the English questionnaire by May 2002. Using the U.S. Postal Service instead of the Internet was intentional, so that those who were less comfortable with the Internet would respond to the survey.

After the questionnaires were returned to the third author, they were divided into four groups based on the teacher's institution: elementary school, middle/high school, post-secondary school, and others, such as supplementary schools/Saturday

Japanese language schools. Within each instructional-level group, the number of respondents who chose each answer under each question was counted and converted into a percentage by dividing the number of responses by the total number of respondents. When multiple answers were permitted, the number of respondents who chose each answer was divided by the total number of respondents, thus resulting in totals higher than 100%.

Once all the data were analyzed as described above, the results were compared across the three groups. The results were tabulated according to the three groups so that similarities and differences could be identified among elementary school, middle/high school, and post-secondary school teachers.

RESULTS

Out of 500 participants, 225 responded (45% response rate). However, nine were excluded: Four did not answer as instructed, and five were not teaching at the time of the study. As explained above, the questionnaire could be answered in either English or Japanese. Of the remaining 216 participants, 93 returned the English version of the questionnaire, while 118 responded to the Japanese version. Five responded in both versions. All participants' responses but one were identical in English and Japanese. One participant failed to provide information about Websites used for instruction in the Japanese version of the questionnaire, but provided complete information in the English version. Thus, in this participant's case, the responses in English were used for the data analysis.

In terms of the level at which they taught, 20 participants indicated they taught at multiple institutions; thirteen taught in two, and seven taught in three. Therefore, these cases were double and triple counted. Consequently, 243 responses were entered into the final data pool.

Out of 243, 18 (7.4%) were elementary school teachers, 88 (36.2%) middle/high school teachers, 117 (48.1%) post-secondary school teachers, and 20 (8.2%) were others, such as adult education teachers. We focus on the first three groups in this analysis and present the results of the 223 responses with emphasis on the following three areas: 1) the teacher's environment for computing and Japanese capability, including technical support, 2) availability of computers at school for class use, and 3) technology-related projects completed in class.

1 Japanese Teacher's Computing Environment
The results of the survey indicate that the percentage of teachers who have a computer for exclusive use increases as the institutional level goes up. Fourteen out of 18 (77.78%) elementary school teachers, 75 out of 88 (85.2%) middle/high school teachers, and 107 out of 117 (91.5%) post-secondary school teachers stated that they have their own computers. Regardless of the level of institution, however, the majority of the Japanese teachers participating in this study appear to be able to use computers at their convenience, which may grant them more opportunities to familiarize themselves with computers and learn how to use them for instructional

purposes.

   With regard to the operating systems of the respondents' computers, it was found that Japanese teachers use both Windows and Macintosh, although Windows machines were much more popular among middle/high school teachers than other levels. Table 1 presents the types of operating systems used by the Japanese teachers who responded to the survey. Note that the teachers were asked to check all the operating systems on their computers and that the number of respondents who chose each operating system was divided by the total number of teachers within each group. This is why the sum of all responses exceeds the total number of participants in each group (i.e., larger than 100%). The fact that the figures did not add up to 100 indicates that many participating teachers chose multiple operating systems; in other words, they are likely to alternate between two operating systems on a regular basis.

Table 1   Operating Systems Used by Japanese Teachers (Multiple Answers).

	Elementary (N = 18)		Middle/High (N = 88)		Post-secondary (N = 117)	
	#	%	#	%	#	%
Windows 95 (E)	1	5.6	8	9.1	10	8.5
Windows 98 (E)	6	33.3	37	42.0	34	29.1
Windows Me (E)	2	11.1	13	14.8	5	4.3
Windows NT (E)	0	0	2	2.3	2	1.7
Windows 2000 (E)	2	11.1	19	21.6	21	17.9
Windows XP	1	5.6	7	8.0	15	12.8
Mac OS 8.x	4	22.2	11	12.5	23	19.7
Mac OS 9.x	4	22.2	20	22.7	51	43.6
Mac OS X	1	5.6	5	5.7	5	4.3
Other Mac	0	0	5	5.7	0	0
Other	2	11.1	2	2.3	9	7.7
Total	23	127.8	129	146.6	175	149.6

   Moreover, Table 1 indicates the popularity of Macintosh operating systems among Japanese teachers when compared to the general population of computer users. The distribution of Windows and Macintosh users are: 66.7% vs. 50.0% at the elementary school level, 97.7% vs. 46.6% at the middle/high school level, and 74.4% vs. 67.5% at the post-secondary school level, respectively. According to recent market research, general Macintosh users in the United States accounted for 3.2% of the whole market in 2003 ("Apple U.S." 2004). In terms of the school computer market, Macintosh use amounted to 26% in 2001–2002 (Trotter, 2002). However, this study's results show that Macintosh is popular among Japanese teachers.

As to the versions of the operating systems, the result shows that post-secondary school teachers tend to use newer operating systems than elementary and middle/ high school teachers. This tendency is more pronounced in the case of Windows: While 12.8% of the post-secondary school group use the newest operating system Windows XP, only 5.6% of the elementary school group and 8.0% of the middle/ high school group do so. On the other hand, older Windows operating systems such as Windows 95, 98, and Me are used by 50% of the elementary school group (5.6%, 33.3%, and 11.1%, respectively) and 65.9% of the middle/high school group (9.1%, 42.0%, and 14.8%, respectively), whereas 41.9% of the post-secondary school group (8.5%, 29.1%, and 4.3%, respectively) use them. Although Windows 95, 98, and Me have the most restricted Japanese capability, they are used frequently in elementary and middle/high schools.

2   Japanese Capability in Word Processing, E-mail, and Web Browsing

Table 2 summarizes responses regarding the Japanese capability of three of the most frequently used applications: word processors, Web browsers, and e-mail.

Table 2   Japanese Capability in Word Processing, E-mail, and Web Browsing.

		Elementary (N = 18)		Middle/High (N = 88)		Post-secondary (N = 117)	
		#	%	#	%	#	%
Word processing	Yes	15	83.3	82	93.2	104	88.9
	No	3	16.7	6	6.8	13	11.1
Web browsing	Yes	12	66.7	66	75.0	101	86.3
	No	6	33.3	22	25.0	16	13.7
E-mail	Yes	14	77.8	62	70.5	101	86.3
	No	4	22.2	26	29.5	16	13.7

More than 80% of the participants in each group responded that they could use word processors in Japanese. When it comes to Web browsing and e-mail, however, the rate of Japanese capability declines drastically in the elementary school and middle/high school groups. Capability among the post-secondary school group remains almost the same.

There was a noticeable difference between institution levels in terms of whether e-mail was possible in Japanese. That is, while nearly 90% of post-secondary educators have Japanese-capable e-mail, only 77.8% of elementary school educators and 70.5% of middle/high school educators do.

3   Technical Support

Responses to the questionnaire reveal teachers rely on personal resources for technical support. Table 3 shows that almost half of the teachers in the elementary

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school, middle/high school, and post-secondary school groups (55.6%, 43.2%, and 43.6%, respectively) stated that they rely on family and/or friends when technical problems arise.

Table 3   Sources of Technical Support (Multiple Answers).

	Elementary (N = 18)		Middle/High (N = 88)		Post-secondary (N = 117)	
	#	%	#	%	#	%
Family/Friends	10	55.6	38	43.2	51	43.6
Colleagues at work	5	27.8	25	28.4	55	47.0
Tech support at school	4	22.2	27	30.7	57	48.7
Mailing lists	1	5.6	8	9.1	8	6.8
Books/Manuals	2	11.1	14	15.9	21	18.0
Internet	1	5.6	10	11.4	17	14.5
No one to ask	2	11.1	23	26.1	10	8.6
Other	1	5.6	5	5.7	6	5.1
Total	26	144.6	150	170.5	225	192.3

While informal help was found to be popular across all three groups, a clear difference separates the post-secondary group from the other two. That is, 48.7% of responses from post-secondary teachers stated that they received "tech support at school," making school technical support the top source for help. On the other hand, the same item was named as a source of help by only 27.8% in the elementary school group and 30.7% in the middle/high school group. This result may indicate that insufficient technical support physically exists at the elementary and middle/high school levels. Even if technical support exists, it may not be as good as the participating teachers desire it to be, leading to less reliance on technical support at school. It is perhaps unreasonable to expect multilingual expertise from technical support personnel whose job is already in high demand. It is not uncommon to see a single individual responsible for an entire school, or sometimes, an entire school district. It may also indicate the richer resources available at post-secondary schools, possibly due to higher funding and the frequent existence of research centers specializing in Asia or Japan within the university systems.

4   Computer Facilities at School

Regarding the availability of computer facilities at school, 11 out of 18 (61.1%) elementary school instructors, 70 out of 88 (79.5%) middle/high school instructors, and 90 out of 117 (76.9%) post-secondary school instructors answered that they have computer facilities at school where they can take their students. These figures show that there are still schools with no computer facilities on site, but the findings of the survey indicate that many participants teaching at such schools had their students

use home computers to complete assignments. In addition, one participant informally responded in personal communication with the authors that individual students are required to purchase a laptop computer at her institution and that there is no longer a computer laboratory in the traditional sense.

Table 4 Availability of Computers in Facilities at School (Multiple Answers).

	Elementary (N = 11)		Middle/High (N = 70)		Post-secondary (N = 90)	
	#	%	#	%	#	%
Teacher only	1	9.1	4	5.7	2	2.2
Teacher + 1–5 students	3	27.3	10	14.3	13	14.4
Teacher + half of class	1	9.1	12	17.1	18	20.0
Teacher + half – most of class	2	18.2	14	20.0	25	27.8
Teacher + all students	5	45.5	35	50.0	29	32.2
No answer	0	0	3	4.3	9	10.0
Total	12	109.1	78	111.4	96	106.7

In terms of the availability of computers in school facilities, however, half or somewhat less than half chose "teachers and all students" as their answer regardless of the level of institution. In other words, it is likely that students have to share a computer. It is desirable, although not always necessary, for each student to have a personal computing station for self-paced, self-study exercises.

5 Projects Completed in Class

Finally, the survey revealed that the participants have engaged students in a variety of computer-enhanced projects in class thus far (see Table 5). In particular, the fact that the total percentage of answers is larger than 100 indicates multiple projects per instructor at the middle/high school and the post-secondary levels: 238.1% in the middle/high school group and 286.7% in the post-secondary group.

At the elementary school level, slide presentations, e-mail exchange, and research projects with Web information were the most popular (38.9% for each), followed by class newspapers, reading Web pages with help tools, and the Bulletin Board System (16.7% for each). Middle/High school teachers reported more variety in the project types, with Web-based research projects being most frequently mentioned (53.4%).

Other popular projects at the middle/high school level were similar to those at the elementary school level: Slide presentations were mentioned by 39 teachers (44.3%), e-mail exchange by 27 (30.7%) and Web page presentations by 16 (18.2%). With regard to the post-secondary school level, e-mail exchange was the most popular activity (41.2%), followed by slide presentations (35.9%) and Web-based research projects and presentations (29.1% and 20.6%, respectively).

Table 5 Computer-enhanced Projects Done in Class (Multiple Answers).

	Elementary (N = 18)		Middle/High (N = 88)		Post-secondary (N = 117)	
	#	%	#	%	#	%
Slide presentation	7	38.9	39	44.3	42	35.9
Class newspaper	3	16.7	6	6.8	7	6.0
E-mail exchange	7	38.9	27	30.7	49	41.2
Reading Web page with helper tool	3	16.7	16	18.2	24	20.6
Web page presentation	1	5.6	8	9.1	14	12.0
Research project with Web information	7	38.9	47	53.4	34	29.1
Chat	2	11.1	4	4.6	16	13.7
Video editing	2	11.1	9	10.2	11	9.4
Bulletin Board System	3	16.7	2	2.3	7	6.0
Other (e.g., WebCT, online exercises)	1	5.6	14	15.9	11	9.4
Total	36	200.0	172	195.9	215	183.8

DISCUSSION

To recapitulate, the present study investigated the current computing situation among Japanese educators in the United States. First, the results of the survey indicate that Macintosh is as popular as Windows among Japanese educators in the United States. This may be because Apple had support for Japanese language on English operating systems as early as 1993. However, since Microsoft's Windows 2000 and Windows XP come with Japanese font sets and IME free of charge, the ratio of Windows users in Japanese language education may increase from this point.

Notable differences among institutions were also found: Japanese educators at the middle/high school level are still using older systems that do not have built-in Japanese capability. Newer systems, specifically Apple's Macintosh OS 9 and OS X and Microsoft's Windows 2000 and Windows XP, come with Japanese font sets and IME, allowing users to use Japanese in English environments. Some software cannot handle Unicode even under these Japanese-enabled systems, and this remains a significant problem; however, most teachers are able to find compatible software for basic functions, such as word processing, e-mail, and browsing the Internet. This is an improvement over using localized Japanese versions of operating systems configured for the Japanese market. This is because its interface is in Japanese, and it may be overwhelming for some non-native speaking teachers of Japanese.

As stated earlier, few schools have technical support with significant multilingual-computing knowledge and skills. Thus, teachers cannot expect full support in this

regard. More recent versions of operating systems allow technical support staff to handle such basic matters as installing Japanese fonts and performing basic trouble-shooting using English. Older systems, the kind found at the elementary and middle/high school levels, did not have this option. This results in even less effective support for teachers at these levels.

With regard to the availability of computers for exclusive use, almost all teachers in this study have a computer available for their exclusive use. This may be because, generally, teachers have sufficient funding for the purposes of obtaining computers for instructional use, and furthermore, they are increasingly considered essential. In addition, personal computers are more than ever regular household items. Such institutional and personal computing situation may result in teachers having easy access to computers.

Cotton (1995) states that before teachers can integrate computer technology into teaching, they themselves need to feel comfortable with computers. Comfort comes from familiarity, and such familiarity will increase when teachers have ample opportunities to use computers and explore ways of utilizing them. In other words, because computers are commonly available for exclusive use, teachers will likely become familiar with using computers as an instructional tool, leading to the active use of technology in teaching. Supporting this conclusion is the fact that many participants in the survey mentioned a variety of Websites that can be used for teaching preparation or for their students' self-study. Teachers seem to be using the Internet and computer-enhanced projects not only in preparation and personal communication, but also in actual teaching.

While this is impressive, it was also found that the younger the students, the less likely their teachers had advanced operating systems with built-in Japanese capabilities. Elementary and middle/high school teachers may not have the same office space and equipment as university teachers. Although federal and state governments have committed to providing increased technology to K-12 students, the most pressing need is for updated operating systems that have built-in Japanese capabilities.

As for Japanese capability in applications, the results revealed that more than half of the teachers participating in this study are technically equipped to do word processing, Web browsing, and e-mail in Japanese. In all groups, the percentage able to do word processing in Japanese is highest, followed by Web browsing and e-mail. This may be due to Japanese instructors using e-mail less frequently in their teaching than word processing and Web browsing applications. Word processing is now essential for creating handouts, quizzes, and tests; while Web browsing may be used to search for teaching materials online. On the other hand, Japanese teachers may use e-mail largely for personal matters, which need not be done in Japanese.

Should this be the case, Japanese teachers, particularly those non-native speakers of Japanese, might be missing a great opportunity to improve or maintain their own language proficiency level. E-mail, a faster and easier medium of communication than letters, provides opportunities for non-native Japanese teachers to use Japanese every day, a chance they may not normally have outside their classes. In other

words, Japanese-capable e-mail allows users to maintain and even enhance their language skills, which is part of professional development. Furthermore, using e-mail in Japanese on their own may help teachers gain experience with e-mail programs, a skill that can benefit classroom activities. One such activity, e-mail exchange, connects students with speakers of the target language outside the classroom, and thus has often been described as being very helpful for learning foreign languages (Kern 1998, Van Handle and Corl 1998, Hertel 2003). E-mail is relatively complicated in that it involves not only user-end machines on both the sending and receiving sides, but also e-mail servers. This additional complication may prevent Japanese teachers from utilizing e-mail in Japanese. In order to start gaining the benefits of using e-mail in Japanese, more training or support for it may be needed.

All in all, most of the participants report that they can use Japanese in at least one of the most common applications (i.e., word processing, e-mail, and Web browsers). The main issue for Japanese teachers now seems to be more pedagogical than technical. Technical problems (such as making computers Japanese capable) should deserve less attention than how to use technology effectively. Activities should fit smoothly and effectively into the existing curriculum, and should accomplish clear instructional goals. Even so, teachers still need to be familiar with Japanese capability issues so that their students' home computers (or lab computers) can also be made Japanese capable.

While it seems that Japanese-capable computers are available to the participants, technical support on multilingual computing is not as accessible. Across all groups, family and/or friends were the top choice for technical support. Lam (2000) points out that second and foreign language teachers' lack of experience with computers often hinders their using computers in their practice. Technical support is crucial to the goal of utilizing computers in language classroom instruction. Nevertheless, this study revealed that instructional support is limited. It might be that the linguistic aspects of multilingual computing lead to either poor or nonexistent technical support at school, considering that technicians typically have little or no experience with computing in languages other than English. The inevitable result is that Japanese teachers end up relying on personal sources such as family, friends, and colleagues at work for trouble-shooting.

Our follow-up study (Fukai, Omoto, and Schneider 2003) confirmed our hypothesis. For the follow-up study, we interviewed 11 Japanese teachers at all institutional levels who had participated in the present survey study in order to examine individual cases of technology use. According to our analysis of the interviews, seven out of the 11 teachers generally sought help for technical problems from family, friends, and students rather than from technical support personnel at their school. Among these, two interviewees explicitly stated that they relied on support from outside school because the school technical specialists were incapable of dealing with Japanese computing due to their lack of knowledge of multilingual computing and/or the Japanese language itself.

There are a few possible ways to solve the current problem of limited or

unavailable school technical support. One would be to train technical specialists through workshops specifically aimed at dealing with multilingual computing. Another option is for Japanese teachers themselves to gain the necessary knowledge and technological skills by attending workshops.

Despite their promise, these solutions would require extensive amounts of time and funding, as well as the willingness of specialists and teachers to acquire these new skills. Not everyone who is interested in utilizing technology may be able to afford it or have sufficient time. In these cases, a system of mutual support communities may allow language educators and support personnel with multilingual computing expertise to guide and support each other. Johnston and Janus (2003) argue that, because research has shown that teachers learn best from each other, collegiality in general is essential in professional development. Based on their survey on the use of technology by first-year teachers, Strudler, McKinney, and Jones (1999, 126) also suggest that "additional mentoring support via telecommunications" from expert users can help novice users use technology for instructional purposes. While the number of such support communities has been increasing through electronic mailing lists and Websites, it is likely that many Japanese teachers are not aware that such resources exist. Therefore, to facilitate the use of computers in Japanese language education, it is essential to inform Japanese teachers of such online communities and to encourage them to participate.

The results obtained regarding computer facilities have led to the question of how to develop materials and activities appropriate for small groups of students sharing one computer. Most of the Japanese teachers participating in this study stated that they have some sort of computer facility where they can teach Japanese. However, the computer laboratories in pre-college-level institutions typically did not have enough computers for all students. Insufficient computer facilities may initially seem discouraging, but this can be turned into an advantage if teachers promote cooperative learning. Collaboration with peers increases opportunities for the negotiation of meaning, which in turn contributes to the students' development of their interlanguage system (Gass 1997). In addition, from a sociocultural perspective, collaboration among students provides opportunities for students to take advantage of their more capable peers to develop their abilities and to proceed to the next level (Ohta 1997). Thus, despite limited resources, creative and careful planning of group projects allows students to collaborate with others, facilitating scaffolding among peers, which in turn positively influences learning.

As for actual classroom use of technology, the present study found that Japanese teachers actively use technologies in their classrooms, but they may rely on English resources. E-mail exchange was frequently mentioned, along with research projects using Web page information. From the Websites listed by the participants on the survey, it seems that most of the research projects are done in English. In addition, fewer teachers than expected assigned such activities as reading Web pages with helper tools (e.g., online dictionaries). Considering the level of the participating teachers' students, Web-based research projects are likely to rely on English resources. Furthermore, a vast number of characters are used in writing Japanese, and

so reading authentic Japanese texts poses a challenge to students (Kubota 1999). Even with helper tools, reading online materials in Japanese can easily overwhelm students, particularly those at the novice or intermediate levels, the levels taught by many of the participants of this study. This may be a case of using online resources in English rather than those in Japanese.

The Web offers a variety of authentic, current resources (Kost 1999) as well as tools that not only help students read texts but also develop critical thinking skills. However, as Harrison (1998, 446) states, it seems that "integrating authentic materials into the classroom presents new challenges for teachers," including the problem of finding materials suitable for their students from amidst the vast amount of resources of varying quality and content. To make the most of these resources, Japanese teachers need training in how to best utilize authentic materials that can allow language to be learned in context. For instance, Japanese teachers can benefit from discovering how to create tasks requiring critical thinking skills. An example of such a task is WebQuest, developed by Bernie Dodge of San Diego State University.[4] As discussed above, many research projects at this point seem to use English Websites. Even with non-Japanese resources, creative tasks with clear goals and the opportunity to think critically can make an Internet search more than just information retrieval, and this can contribute to the students' learning process.

Finally, close examination reveals that the same projects were frequently mentioned across the three levels. Typical projects include conducting research on the Internet and then arranging the information with a slide presentation application, such as PowerPoint. E-mail exchange is also popular, as the number-one activity for elementary and post-secondary levels. However, it ranks third at the middle/high school levels. This difference might be due to problems with computers' Japanese capabilities, as discussed above.

The question accepted multiple answers, and it is noteworthy that the middle/high school group reported the largest number of projects. A possible explanation is that the middle/high school levels have greater freedom in the curriculum than the university level. In addition, more so than elementary school students, middle/high school students are old enough to have computer literacy skills learnt in computer classes, and are more open to innovative computer-based learning techniques.

CONCLUSIONS, LIMITATIONS, AND DIRECTIONS
FOR FUTURE RESEARCH

The present study investigated three areas regarding the use of the Internet and computers for Japanese language instruction: the teacher's computing environment as it relates to Japanese, the availability of computers at school for instructional use, and technology-related projects completed in class. The results indicate that many of the Japanese teachers who participated in this study have access to Japanese-capable computers that they use for instructional purposes. Often the teachers have

[4] More information on WebQuest can be found at http://webquest.sdsu.edu/

a computer for their exclusive use and can do word processing, e-mail, and/or Web browsing in Japanese. Schools have computer facilities where they can take their students, even though the number of computers may not be sufficient for individual use. The Japanese teachers participating in this study utilize the Internet and computers to some extent in their instruction.

While the picture drawn by this study shows that Japanese teachers in the U.S. can and do take advantage of technology, the results also call our attention to two problem areas. One is the reliance on private sources for technical support. Many of the participating teachers in the survey seek more help from friends, family, and colleagues than from technical specialists at school, possibly due to the specialists' lack or limited knowledge of Japanese computing and the language itself. The other area worth attention is how technology is integrated into the teaching of Japanese. As discussed above, the present study indicates that the participants actively used technology in their instruction. However, their techniques and especially their use of the Internet, still seem limited; Websites mentioned by the participants imply that Japanese-related research projects are largely done in English.

Technology-focused training for Japanese teachers must address certain key problems. First, it should address the issues surrounding Japanese computing in English operating systems, particularly problems stemming from the complexity of Japanese encoding systems. In part, the limited availability of technical support makes it impossible for Japanese teachers to take advantage of technologies as fully as teachers of European languages. Should Japanese teachers understand what common problems are and how to deal with them, limited technical support would not be the hurdle that it is now. In addition, it is likely that once Japanese teachers overcome their discomfort with technology, they can begin to think about putting technology into practice. Thus, training can empower Japanese teachers by increasing their opportunities to apply technology in instruction.

Furthermore, it is necessary to provide Japanese teachers with information and training on how to more effectively use the Internet for Japanese language learning. Tohsaku (2004) argues that being able to utilize technology entails searching through the necessary technologies, evaluating them, selecting from these choices, and then using them effectively to achieve goals. However, technology-related workshops and training sessions often result in mere demonstrations of available technologies. For maximum benefit, technology-focused training of Japanese teachers should not only introduce them to new tools, but also address their current technology skills and their actual computing environments. The workshops should present flexible templates that can be modified by participants later. The teachers, for their part, need to understand the essentials of teaching, such as second language acquisition theories, teaching methodologies, curriculum development, lesson planning and assessment, so that technology does not dictate and inversely reduce the effectiveness of teaching.

Moreover, such training needs to be situated in the real-life classroom. Egbert, Paulus, and Nakamichi (2003, 122) surveyed 20 teachers who took a graduate-level course on computer-assisted language learning and found that the participants

strived for "contextualized instruction directly related to the teaching environments in which language teachers will be practicing." A similar need was also expressed by one of the participants in our interview study who stated that workshops and training sessions are often not as beneficial as expected because many of the technologies introduced required newer operating systems and higher technology skills than teachers actively possessed in their classrooms. Without evidence that technology can positively change learning outcomes, teachers are reluctant to use technology (Lam 2000). By learning from classroom-situated examples of technology use, teachers will see how technology can enhance their instruction, and they will gain skills and knowledge transferable to their own practice.

Technological capabilities have become more essential for Japanese teachers in the United States with the publication of the *National Educational Technology Standards for Teachers* (NETS • T; NETS Project 2000). NETS • T defines "the fundamental concepts, knowledge, skills, and attitudes for applying technology in educational settings" in the United States under six major standards and 23 goals for educating students (NETS Project 2000, p. 8). This document clearly sets forth high expectations regarding teachers' ability to understand technology and use it to its best advantage in classroom instruction. Technology-focused training will allow Japanese educators to acquire the knowledge and skills described in NETS • T, preparing Japanese teachers for future requirements ahead of time.

While the survey study in this paper shed some light on the current status of computer use by Japanese teachers in the United States, some limitations should be noted and considered as possible areas of future research. First, the questionnaire employed in the study focused on the physical environment of Japanese teachers in terms of technology and the ways that they take advantage of it. Consequently, the survey collected no information about what kind of training participants have received in integrating technology into their practice. As suggested earlier, training in the use of technology for instruction is an important part of professional development, enhancing teaching and learning through making the best possible use of modern technology. To better understand the needs of Japanese teachers who want to use technology effectively, future studies should examine how they learn to use technology and identify the skills and knowledge that need to be addressed in training.

Furthermore, because the questionnaire was used as a data collection instrument, responses from the participants were necessarily limited to the choices given on the questionnaire, thus an in-depth, detailed picture of technology use by Japanese teachers is lacking. For instance, the participants could respond that they had their students do technology-enhanced presentations, but they were unable to provide us with information as to how such presentations were conducted. The present study has laid the groundwork for understanding the current condition of technology use by Japanese teachers in the United States, but future questionnaires should be modified so as to elicit more information, for example, by incorporating open-ended questions about objectives, their role in the curriculum and the procedures of technology-enhanced projects.

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APPENDIX

Survey on the use of computer and the Internet

Note: Participants were asked to specify their answers if they chose "Other."

1. What levels do you teach? (Please check all that apply.)
   ( ) Elementary/Immersion   ( ) Middle/High School   ( ) Post secondary
   ( ) Gov't/Adult Ed   ( ) Saturday School (Hoshuko)   ( ) Other
2. Do you use computer for class preparation and personal use?
   ( ) Yes   ( ) No
3. Please check operating system(s) of your computer(s) you use for class preparation and personal use. (Please check all that apply.)
   ( ) Windows 95(E)   ( ) Windows 98 (E)   ( ) Windows Me (E)
   ( ) Windows NT (E)   ( ) Windows 2000   ( ) Windows 2000

( ) Mac OS 9.x ( ) Mac OS 8.x ( ) Mac OSX
( ) Unknown ( ) System purchased/made in Japan ( ) Other

4. Either at work or home, do you have a computer you can use exclusively without sharing with someone?
( ) Yes ( ) No

5. If you have problems with Japanese computing, who do you ask for help? (Please check all that apply.)
( ) Family/friends ( ) Colleagues at work ( ) Tech support at work
( ) Electronic discussion lists ( ) Books/manuals ( ) Internet
( ) I don't have anybody to ask ( ) Other

6. Where do you most often connect to the Internet? (Please choose only one.)
( ) Office/Work ( ) Home ( ) Lab ( ) Library ( ) Other

7. What is the type of connection at the location on #6? (Please choose only one.)
( ) Modem ( ) DSL/Cable ( ) LAN/School network
( ) Unknown ( ) Other

8. Please check if your computer(s) you use for class preparation and personal use are capable of Japanese in following software:
( ) Word processor ( ) e-mail
( ) Web browser (e.g., Internet Explorer, Netscape)

9. Do you have computer facilities you can take your students in class?
( ) Yes ( ) No [if No, go to #12]

10. If yes to #9, please check if the computers are capable of Japanese in following software:
( ) Word processor ( ) e-mail
( ) Web browser (e.g., Internet Explorer, Netscape)

11. If yes to #9, how many computers are available? (Multiple answers are possible with more than one class or facility.)
( ) Teacher's station only
( ) Teacher's and 1–5 stations for students
( ) Teacher's and up to half the number of your class
( ) Teacher's and half to almost all of your class
( ) Teacher's and all of your class

12. Please list web sites that you recommend to your fellow teachers for materials. (If any)

13. Please list web sites that you recommend to your students for self-study. (If any)

14. Please list web sites you use in class. (If any)

15. Please check/list computer-enhanced projects you have done. (If any)
( ) Presentation (e.g. PowerPoint) ( ) class newspaper
( ) e-mail exchange ( ) Reading Web page with helper tools
( ) Web page presentation ( ) chat
( ) Research project with web page information ( ) video editing
( ) BBS (Bulletin Board) ( ) Other