A mixed-method study of EFL teachers’ Internet use in language instruction

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Abstract

Information and communication technology has affected language instruction in Taiwanese higher education. Varieties of assorted Internet tools are incorporated in educational settings to engage students in learning. To facilitate the improvement of teacher preparation for Internet use, it is important to study the factors influencing teachers in integrating the Internet into their instruction. A concurrent mixed-method approach is employed in this study. Both quantitative and qualitative results show that teacher training is crucial for Internet-integration instruction by the teachers of English as a foreign language (EFL) in Northern Taiwanese higher education institutions. Continuous professional development focused on technology application in language instruction is imperative.

Keywords: Information and communication technology; Language instruction; Internet use; Teacher training; English as a foreign language; Continuous professional development; Taiwan

1. Introduction

The development and ubiquity of the Internet has affected language instruction. The abundance of resources on the World Wide Web has brought convenience for language teaching and learning. Recent literature reveals that increasing numbers of language teachers are involved in Internet-integration instruction (Fischer, 1999). In facing this digital era and contemporary students who have grown up on computers and are quite comfortable in using the Internet, most teachers are increasingly aware of the trend to incorporate and integrate computer technology into their instruction. Accordingly, educators are concerned about effective integration to engage students in meaningful learning (Koehler, Mishra, Hershey, & Peruski, 2004).

Technological advancement and globalization have affected language instruction in Taiwanese higher education institutions. The Multimedia English Learning and Instruction Association (ROCMELIA) was established and the first national conference on multimedia language education was held in 1996. Since then, a growing number of college faculties have attempted to enhance language education through the innovative application of computer technology (Liu, 2005).

As teachers are the key persons who will promote any innovation in education, it is important to help them integrate technology effectively into their
instruction (Pettenai, Giuli, & Khaled, 2001). To facilitate the improvement of instructional efficacy of Taiwanese EFL teachers in the use of the Internet, it is important to discover the factors influencing these teachers in integrating the Internet into their instruction. Few studies have examined the factors influencing EFL teachers’ use of the Internet (e.g., Egbert, Paulus, & Nakamichi, 2002; Moore, Morales, & Carel, 1998) and none have specifically addressed Northern Taiwanese EFL teachers. While this study is specific to Northern Taiwan institutions of higher education, the findings may assist policy makers, professional development course designers, and language teachers around the globe interested in using the Internet for educational purposes.

2. Literature review

2.1. Internet use in language instruction

The use of modern technology in teaching languages has been dramatically increasing worldwide over the past decade (e.g., Chen, Belkada, & Okamoto, 2004; Eskenazi, 1999; Nelson & Oliver, 1999; O’Dowd, 2003; Pennington, 1999; Toyoda & Harrison, 2002; Warner, 2004). With the creation of the World Wide Web, it has become possible and feasible for language teachers to make effective use of instructional materials, especially in teaching language and culture (e.g., Belz, 2003; Johnson & Brine, 1999; Kramsch, A’Ness, & Lam, 2000; O’Dowd, 2003; Thorne, 2003). Computer-assisted language learning (CALL) programs provide multimedia with video, sound, graphics, and text, which allow learners to be exposed to the target language and the culture. Learners explore the simulated environment with meaningful multimodal forms such as audio and visual input, which facilitates comprehension in listening and reading (Chun & Plass, 1997). One benefit of using Internet resources is that teachers can easily retrieve the most recent and pertinent information for their students (Moore et al., 1998). The development of hypertext and hypermedia within the context of the World Wide Web offers a vast array of resources for both teachers and students to search and access authentic materials. However, most studies have examined how teachers make use of modern technology in teaching language; few have examined why teachers incorporate the Internet into language teaching and learning.

2.2. Barriers to implementation of information and technology communication (ICT)

Many factors influence the successful implementation of technology. In reviewing the literature, the issues and barriers that teachers encounter while using technology are generally categorized into first- and second-order barriers identified by Cuban (1993). First-order barriers are external and institution related, whereas second-order barriers are internal and teacher related (British Educational Communications and Technology Agency, www.becta.org.uk, 2004). Research evidence of these barriers is synthesized and analyzed in several studies (Becta, 2004; Sugar, 2002). Institution-related barriers entail availability (Pelgrum, 2001), accessibility (Fabry & Higgs, 1997), technical and administrative support (Fullan & Stiegelbauer, 1991), complexity and unreliability (Fullan & Stiegelbauer, 1991) and funding (Fabry & Higgs, 1997). Teacher-related issues include time (Cuban, Kirkpatrick, & Peck, 2001), confidence (Ertmer, Addison, Lane, Ross, & Woods, 1999), knowledge and skills (Pelgrum, 2001), training (Fabry & Higgs, 1997), previous negative experience (Fabry & Higgs, 1997), fear and anxiety (Russell & Bradley, 1997), classroom style (Ertmer et al., 1999), motivation (Ertmer, 1999), belief (Mumtaz, 2000), and attitudes (Migliorino & Maiden, 2004). These barriers to technology use are interrelated to affect teachers’ integration of technology into teaching and learning (Ertmer, 1999).

Teachers may not encounter all of these barriers, but any single barrier may prevent teachers from meaningful implementation (Ertmer, 1999). Sugar (2002) argued that, even if the first-order barriers are removed, there existed teacher reluctance to use technologies. Most teachers are constrained by time and heavy workloads, and technology integration requires time and effort in order to be effectively embedded into curriculum and teaching practices (Aust, Newberry, O’Brian, & Thomas, 2005; Koehler et al., 2004). There is often a conflict between the investment of time and the value of making such instructional changes; therefore, to keep up with the ever-changing and evolving technologies and constantly expanding Internet resources, teachers will require assistance. For example, Browne, Maeers, and Cooper (2000) provide a Community of Learners Model in which they designed 12 workshop topics and hired six technologically advanced students to teach faculty
technological skills such as web page development. The workshops were quite successful in assisting faculty in skill development and application.

2.3. Beliefs and attitudes

Teachers implementing innovation largely depend on their cognitive and affective schemes (Handal, 2004). For teachers to take the initiative in curricular change and to effectively apply technology for meaningful instruction, teachers' beliefs and attitudes are the two major internal factors identified by researchers (Ertmer, 1999; Fabry & Higgs, 1997).

Anderson and Bird (1995) state that “Beliefs include the frames of references or the perspectives that teachers use to make sense of their practice and its effects on their students” (p. 480). Teachers' extant beliefs have to be transformed for curricular change to occur. However, teachers' beliefs and knowledge may not support new perspectives in their instruction. Therefore, Fullan (1993) argues that it is essential for teacher educators to take into account teachers' beliefs about teaching and learning, as not doing so has led in some cases to unsuccessful reform. This has been a challenge in many teacher education courses (Anderson & Bird, 1995; Pajares, 1992). Teachers' beliefs about teaching and learning with ICT are crucial to integration (Mumtaz, 2000; Veen, 1993). For example, in Beggs' study (2000) of 156 full-time faculty members at the University of West Georgia, teachers strongly believed that ICT improved student learning, had an advantage over traditional teaching, and increased students' interest, and these beliefs affected their adoption and continuation of innovation.

Researchers argue that teachers can use ICT to support constructivist learning (Jonassen, Peck, & Wilson, 1999). However, not all teachers hold constructivist beliefs, nor do they demonstrate constructivist behaviors in the classroom. Teachers will still use traditional types of instructional practices while applying technology (Nunan, 1999). Teachers who are more inclined toward constructivist beliefs may be more likely to attempt technology implementation (Becker & Riel, 2000). In Niederhauser and Stoddart's study (1994), among 2170 surveyed teachers, the constructivist group believed that computers are used as a tool and students can use them for information collection, analysis, and presentation, whereas the transmission group believed that computers are used as a teaching machine for presentation, reinforcement, and progress tracking.

Consequently, before innovation adoption, teachers' beliefs should be dealt with to determine the fit of each technology with their personal philosophies of teaching and learning (Fullan & Stiegelbauer, 1991).

Technology integration challenges not only teachers' beliefs but also their attitudes. Fabry and Higgs’s study (1997) reveals that teachers’ perceived relevance of ICT is affected by previous computer experience. Negative attitudes toward computer use decrease confidence and increase anxiety. The use of technology may bring a sense of uncertainty and fear (Fullan & Stiegelbauer, 1991). A lack of technology knowledge and skills could lead to anxiety and lack of confidence; consequently, teachers may feel uncomfortable with technology (Finley & Hartman, 2004; Groves & Zemel, 2000). Therefore, teachers may not have the motivation to change the long-standing instructional practices with which they feel comfortable (Snoeyink & Ertmer, 2001).

Ertmer et al. (1999) claimed five major reasons why teachers are motivated to apply technology in the classroom. Four are related to how learners benefited from their application: excitement, preparation for the future, more interesting lessons for students, and access to students with learning difficulties and attention problems. The fifth one is that teachers enjoy using technology as they become more competent.

2.4. Teacher knowledge

Researchers have long been exploring what makes teachers effective and how to make teachers more effective. Shulman (1986) pointed out that pedagogical content knowledge (PCK) is crucial for teaching effectiveness, which has generated extensive research on teacher education in many disciplines (Chen & Ennis, 1995; Cochran-Smith & Lytle, 1999; Diez, 1988; Freeman & Johnson, 1998). PCK is the conjunction of content knowledge and pedagogical knowledge, which is a professional understanding of the organization, presentation, and adaptation of subject matter to target learners (Shulman, 1987). Teachers should know what is to be learned by target students and how it is to be taught. This knowledge is concerned with (1) what students’ prior knowledge is, (2) how to represent and formulate concepts for students to easily
understand, (3) what instructional approaches better fit the content, (4) what misconceptions students are likely to have and how to correct them, and (5) whether learners’ difficulties are understood.

In terms of technology integration in language instruction, teachers are concerned whether CALL tasks meet the process and principles of language teaching and learning and the criteria of language acquisition (Chapelle, 2001;Susser & Robb, 2004). Therefore, knowing what knowledge base language teachers should have in the 21st century is critical to the integration of CALL. Creatively designing ICT-supported learning activities to generate genuine student-centered instruction and to enhance students’ active learning is an issue for teachers (Bates, 2001;Slobodina, 2000). Teachers need to have a comprehensive knowledge of the potentiality of technologies and the possibilities for language instruction application (Pelgrum, 2001).

Considering the ways technologies are being used or misused in educational settings, whether teachers should be using technologies remains unresolved (Rosaen & Bird, 2003). However, policy makers, administrators, and teacher educators have been eager to ensure that teachers are capable of using technology as an instructional tool (US Congress, Office of Technology Assessment, 1995;Zhao, 2003). Consequently, what teachers should know about technology and how best to help future teachers learn about technology has constantly been a challenge for teacher educators (Zhao, 2003). Margerum-Leys and Marx (2003) identify three types of teacher knowledge of educational technology: content knowledge, pedagogical knowledge, and pedagogical content knowledge of educational technology. Teachers should understand the available and proper technological tools for a particular task and the strategies for using the tools. In addition, teachers should know how to apply general pedagogical strategies to the use of technologies in instruction. Moreover, teachers need to have experience with technology application unique to their area of teaching and learning and be capable of applying such experience to selecting and using technology.

In conclusion, to successfully deal with and make good use of the technological and pedagogical shifts happening in the teaching profession, teachers need different kinds of expertise, knowledge, and skills than those required in the past. Further, when institutions expect teachers to embrace these changes, then these institutions must provide faculty with the necessary support structures and resources. Higher education all over the world is in a period of transformation. If educational leaders and administrators are to lead their colleges and universities forward, they must address teachers’ concerns, which are fundamental to integrating technology into instructional practice.

3. Method

3.1. Research design

The methodology applied in this research is mixed-method, including both quantitative and qualitative methods, which takes advantage of the strengths of one of the methods as a means of compensating for the weaknesses inherent in the other method. The strategy for this mixed-method study is concurrent triangulation strategy, which can result in “well-validated and substantiated findings” (Creswell, 2003, p. 217). The strategy of inquiry used in the quantitative part of the study is a survey, whereas the strategy of inquiry applied in the qualitative part is an interview.

3.2. Research questions

(1) To what extent do EFL teachers in higher education institutions in Northern Taiwan make use of the Internet in their teaching? How do they use the Internet?
(2) What are the factors that influence the use of the Internet by Northern Taiwanese EFL teachers in higher education institutions?
(3) What are the issues and barriers that these EFL teachers encounter when trying to incorporate the Internet into their instruction?

3.3. Participants

A total of 311 EFL teachers from Northern Taiwanese higher education participated in the quantitative part of the study. Roughly 70 of the 155 Taiwanese universities and colleges are located in the northern part. Both online survey and paper survey were employed. The total response rate is 35%. The online survey yields 32% (240 out of 756) and the paper survey yields 55% (74 out of 135). Twenty-two of the responding teachers were interviewed for the qualitative part of the study.
when the surveys were collected. These 22 teachers, 11 male and 11 female, were from 16 universities and colleges. All, except one, are full-time teachers. Most were referred to the author by other teachers based on their use of the Internet as a teaching tool. A few (2) contacted the researcher out of interest in the research because they were invited to participate in the survey. A few others (3) are individuals the researcher knows personally as either classmates or colleagues from universities where the researcher was a student or a teacher.

3.4. Instruments

A questionnaire was developed to examine the factors influencing the respondents’ use of the Internet. Through the procedures of literature review, think-alouds, expert review, and a pilot study, items were revised many times for clarity and comprehension. The survey includes eight major sections associated with the eight variables, which are institutional support, beliefs, perceived capability, attitudes, teacher training, constructivist thinking, classroom pedagogy, and Internet use. The dependent variable is Internet use.¹

An interview protocol was developed for the qualitative study. Specific questions based on the research questions, the developed questionnaire, and the initial responses to the survey for the pilot study were prepared prior to the interviews.

3.5. Procedure

3.5.1. Preparation of survey instrument and interview protocol

Validity of both instruments was initially broached by reviewing the literature. For the comprehensiveness, acceptability, and clarity of the survey, five experts were invited to review the items developed on the questionnaire (Dillman, 2000). The “think aloud” procedure (Dillman, 2000) was conducted twice with two Taiwanese EFL teachers having similar backgrounds as the target participants. A pilot study (Gall, Gall, & Borg, 2003) was conducted with Institutional Review Board (IRB) approval. Revisions were made based on the feedback obtained from the above procedures. Both the questionnaire and the interview protocol were reviewed and accepted by the IRB prior to being distributed (Gall et al., 2003).

3.5.2. Implementation of the survey

To conduct a quality survey, the following four sources of errors were minimized: sampling error, coverage error, measurement error, and non-response errors (Dillman, 2000). For instance, to reduce coverage and non-response errors, the survey implementation was mixed-mode. Although the majority of the responses came from the online questionnaire, paper surveys were delivered to increase response rates and to draw a larger random sample. To minimize measurement error, proper design criteria of participant-friendly online and paper surveys were followed (Dillman, 2000).

3.5.3. Conducting the interviews

The 22 interviews were conducted concurrently with the quantitative study. Ten open-ended questions (e.g., What motivates you in using the Internet in your instructional practices?) were asked. These interviews lasted from an hour to an hour and a half. All interviews except one were digitally recorded, transcribed verbatim, and then translated into English for data analysis. That interview was done by telephone due to a time conflict; the researcher took notes while interviewing.

3.5.4. Data analysis

Two steps were involved in the data analysis stage. The quantitative study was statistically analyzed using the mean, standard deviation, frequency and percentage, and structural equation modeling (SEM), whereas the qualitative information was analyzed from the transcriptions of the interviews. An interactive qualitative inquiry within a phenomenological framework was employed (Creswell, 2003; McMillan & Schumacher, 2001). Several themes inductively emerged after the transcriptions were coded. The results from both studies were compared and synthesized.

4. Results of the quantitative study

4.1. Internet use

Among these EFL teachers, four-fifths (n = 249; 80.1%) applied the Internet in their language

¹The reliability coefficients for each are: institutional support (0.86), beliefs (0.86), perceived capability (0.84), attitudes (0.76), constructivist thinking (0.60), classroom pedagogy (0.74), and Internet use (0.92). Kline (1998) proposed rough guidelines for reliability coefficients: 0.90/excellent, 0.80/very good, and 0.70/adequate. Those below 0.50 are unreliable and should be avoided, as half of the observed variance may be due to random error.
instruction. Almost 60% \((n = 186)\) responded that they used the Internet in their actual classroom teaching ‘25% or less.’ Fifteen percent \((15\%, n = 46)\) of the respondents chose the category of ‘between 26% and 50%.’ Only 15 participants spent more than 50% of the class time using the Internet in their actual classroom teaching.

4.2. Knowledge, skills, and application of Internet tools

Of the Internet tools and resources listed in the survey, the responding teachers knew e-mail, online dictionaries, and chat/instant messaging most. The tools they knew least are webfolio/eportfolio, MOO/MUDs (Multi-object Orientation/Multi-user Domain), and natural language processors (NLP). Likewise, they were highly skilled at e-mail, online dictionaries, and using browsers and search engines; however, most lacked skills with MOO/MUDs, webfolio/ePortfolio, and natural language processors. The tools that these teachers applied most in their instructional practices were e-mail, browsers and search engines, and online dictionaries, whereas the tools they applied least were MOO/MUDs, videoconferencing, and webfolio/ePortfolio (see Figs. 1 and 2).

4.3. Curricular area applied

The curricular area for which these EFL teachers most often used the Internet was reading, followed by listening, writing, and culture, respectively. All of the curricular areas applied in which they used the Internet are listed from the least frequent one to the most frequent in Fig. 3.

4.4. Teacher training

Two-thirds \((68.5\%; N = 213)\) of EFL teachers received training regarding technology, with 44 \((14\%)\) of the respondents receiving technology-related degrees. Most teachers reported that they had received their formal training in workshop formats. These workshops lasted from a few hours
to a few days or a few months. The mean number for the duration of workshop is 9 days.

4.5. Summary of structural equation modeling analysis

The study model resulting from the analysis of structural equation modeling (SEM) has a high significance level ($\chi^2 = 372.164$; degree of freedom = 217; probability level = 0.000), which indicates a favorable value. The model has a good statistical fit (GFI = 0.923; CFI = 0.929; RMR = 0.054; RMSEA = 0.049) (Chen, 2006).

All seven variables have effects on Internet use, either directly or indirectly. Teacher training appears to be the most dominant determinant of Internet use and has direct effect. The effect of teacher training is positively related to attitudes, which are positively related to beliefs and perceived capability. The effect of institutional support on Internet use is mediated by teacher training and classroom pedagogy. The effect of constructivist thinking on Internet use is mediated by classroom pedagogy. Classroom pedagogy is positively related to perceived capability and they are both positively related to Internet use. The effect of beliefs on Internet use is mediated by perceived capability.

5. Results of the qualitative study

A number of themes and patterns regarding the factors and issues and barriers in Internet-integration instruction emerged from these 22 interviews. Pseudonyms are given to the participants for confidentiality purposes and to ensure privacy of these teachers.

5.1. Factors that influence Northern Taiwanese EFL teachers in the use of the Internet

5.1.1. Teacher training is important

Active Internet users are teachers who received a technology-related degree or who took technology-related courses. Among them, four teachers obtained a technology-related degree in the US, whereas the others took courses in such fields either in the US or in Taiwan. They feel it is much easier for them to know where the resources are and to know how to use them, compared with other EFL teachers.

Teacher training is important for technology integration into language instruction. For example, Chin-fung, a teacher in a private college, took an 8-week campus training course for putting materials online. Currently, she is able to offer a listening course involving Internet use. She stated, “Without teacher training, I wouldn’t be able to offer the course. If I had time, I wish I could try to get my other courses online. Sue-chin demonstrated the need for more training, “I’ve got my knowledge and skills from attending many workshops. I anticipate attending additional workshops that are related to language teaching.”

5.1.2. The institution’s staff are preparing for the long-term goals of their institutions

Management staff at these institutions either purchase course management software or have their instructional platform software designed. While currently the use of these instructional platforms is not mandatory, most institutions regularly offer workshops for these teachers to familiarize themselves with these tools, which they can use for editing their materials and publishing them online. The majority of these teachers are innovative and creative, so they are able to take advantage of the facilities and infrastructure their institutions have provided and have been able to integrate Internet and technology use into their current instructional practices in various curricular areas. Sue-chin noted
Part of my reason for using the tools that my institution provides is to match the long-term goal of institutional development, i.e., distance learning.

5.1.3. Teachers recognize that Internet-integration instruction is a trend

All interviewed teachers, including a senior teacher who does not use the Internet, recognize the trend toward the use of the Internet in instruction. From a practical standpoint, in dealing with today's students, all teachers expressed that they should try to keep abreast of modern technologies. Chung-hsiang stated, "We are in the stage of Integrative CALL. As using the Internet to increase global communication and enhance cooperation is an issue and trend, teachers need to learn new skills to adjust to changes in the teaching environment. In doing so, they will realize the virtual world facing today's students."

5.1.4. Teachers should utilize many resources on the Internet

The idea that there are abundant resources and tools on the Internet, so there is no reason why teachers should not take advantage of them, influences most teachers' use of the Internet. Tsunhsiang made such remarks, "The Internet provides good resources and authentic materials for language teachers teaching listening and reading comprehension, so why not use it? As a bonus, students like to use the Internet because they get to discuss it." Once these teachers discovered the Internet can provide resources and tools for them to enrich their instruction, the majority immediately started applying it.

5.1.5. Most institutions provide instructional platforms and try to create paperless environments

The use of hard-copy documents has long been a burden for institutions, teachers, and the environment, especially with large class sizes in Taiwan. These teachers all agreed that the use of electronic documents could substantially reduce the use of paper in educational settings. Chih-hung, a young teacher of writing and CALL, expressed, "I find using ICT for instruction is good for the environment because it saves paper. It's also good for teachers because it saves them the work and expense of preparing handouts for large classes." Electronic documents allow teachers to share good materials without having to make lots of copies. Besides, four teachers expressed that providing links to some materials rather than supplying the materials themselves may circumvent possible copyright infringement. Ming-jen noted, "I don't have to worry so much about the copyright problem when I just provide links to the materials."

5.2. Issues and barriers in Internet-integration instruction

5.2.1. Time

Most teachers expressed that it was really time consuming to create online learning materials and activities, except the two teachers who used materials created by publishers. One teacher, Sue-chin, expressed, "Anything related to Internet use takes time. Finding appropriate materials takes time and creating materials takes time too. It also takes time to obtain the knowledge and skills necessary to keep abreast of advancing technologies, and it takes time to keep up with software upgrades and improvements. In fact, there are teachers in my university who don't mind taking time creating materials or learning new tools, yet teaching load, service, and research take their time. Accordingly, they are hesitant to invest more time on online instructional aids if they are not sure that the activities and materials are effective."

5.2.2. Feelings of uncertainty

Most teachers are uncertain which skills they need and which they will actually use. They are afraid that if they take a course but do not apply their new skills immediately, these skills may be forgotten. These teachers' feelings of uncertainty include skills and knowledge necessary for instruction, effective instruction, worthiness of time and money investment and efforts, unforeseen difficulties from technologies, and problems related to institutional support such as inadequate institutional facilities (server and hardware problems), and insufficient Internet access. For example, Wan-ju noted the following after having witnessed first-hand the uncertainties in embracing technology: "I have seen many hardware types and platforms come and go, so I have become reluctant to keep abreast with the changes. I just keep up with the materials I use. Many of my colleagues are not sure of a good entry point for learning technology. The turnover rate is so fast that the whole picture can change within a short time. Therefore, I look for hardware and software that can last for 3 to 5 years for my..."
own use, which helps limit the time I need to spend learning new technologies.”

5.2.3. Inadequate institutional support

Institutional support in the form of commitment to funding is crucial for curriculum reform. Availability and maintenance of infrastructure are only one aspect. The online courses still need to be developed and published. Most institutions have provided only minimal financial support so far, providing incentives and grants to teachers for developing e-learning courses. All teachers developing these courses are doing so in addition to their regular course-loads. Hsin-yin noted the following for the need of financial support: “My department needs additional budget to continue the project and to maintain the previously completed portions. Teachers need to seek outside sources.”

5.2.4. Lack of cooperation or team-work

Only 3 of the 16 universities and colleges that the interviewees are from have cooperative projects. Sue-chin, who was influenced by the tech-savvy teachers in their cooperative projects, continued to create online materials for their courses later on. She said, “From the cooperative projects, teachers were able to get support from other teachers who also experienced frustration from developing online products. Support comes from the friendly competition of trying to finish in a fixed (too-short) time and there is also sharing of solutions and breakthroughs from the beginning to the end.” However, the design of Internet-based language instruction in most institutions is a solitary activity. Chia-hsiang demonstrated the need to share things with others: “Teachers in my university rarely interact but one knowledgeable teacher offers support when I ask about software I may want, like concordancers, etc. It’s this end that I’m weak on. I don’t know what is available, useful, or easy to use. My scope is too narrow.”

5.2.5. Appropriateness of course content

Six teachers are uncertain which course content areas are suitable for using with the Internet. Some may not be suitable. These teachers would like to know if Internet use is applicable to certain course content or what teaching methodologies they can use; this is an area in which additional dialog would be particularly helpful. Ting-fang figured out her own ways of Internet integration, but she pointed out, “To learn technological skills is not enough, I need to have pedagogical knowledge for Internet-integration instruction. I need to know the teaching methodologies. I think teachers should learn more about how to teach the content and the content aspects of teaching for using the Internet.”

5.2.6. Workshops focused on technology application in language teaching

All these language teachers would like not only to improve their technological literacy but also to empower their pedagogical strategies in application of modern technologies. One teacher, Ting-fang, expressed, “Teachers like me who lack technological literacy and knowledge prefer a teacher development program like one held by the Language Teaching and Testing Center and the Ministry of Education in 2002 and 2003, which mainly focused on technology integration in language instruction. I found a course like this I had taken to be quite beneficial and motivational. I would prefer similar programs to be continued and to be held every year or every half a year.”

She further stated, “By gaining information on technology in frequently held programs or workshops, teachers could keep abreast of modern technology upgrades, and they could learn from other teachers in the field. Such programs could offer opportunities to exchange ideas with other teachers who have similar interests, and could offer opportunities for teachers to work together.”

5.2.7. Lack of planning for technology integration into classroom

Digitalization of courses seems to be a common long-term goal for higher education institutional development in Taiwan. In the short term, funds are available in all the institutions because administrators see online learning as a way to boost their enrollments. Many institutions either purchased course management software for teachers or created such software on their own for teachers to use to put their course materials online. However, there is lack of long-term planning and goal setting for technology integration into classrooms. A few teachers try to match up their instructional methods with school policies; however, they are unsure whether Internet implementation is effective or whether it enhances student learning. Wan-ju stated, “I feel that resources are adequate in my university. However, I wonder about the long-term planning for technology integration. In my view, the school IT personnel have little sense of systematic management when
they purchased a new piece of technology. Their response has been to demonstrate the new items to the teachers even though the teachers receive help from their assistants.”

6. Discussion

Research Question 1: To what extent do EFL teachers in higher education institutions in Northern Taiwan make use of the Internet in their teaching? How do they use the Internet?

From the descriptive findings, a majority of these EFL teachers (80%) in northern Taiwanese higher education institutions used the Internet in their language instruction, and among them almost two-thirds ($N = 186$) applied the Internet in a typical class period for 25% or less of the time. These teachers showed a high degree of Internet use in their instructional practices ($N = 249$), whereas the percentage of class time in which they applied the Internet was relatively low. There were only three Internet tools that more than half of these teachers used in their instructional practices: e-mail (69.5%), browsers and search engines (67.2%), and online dictionaries (57.6%) (see Table 1).

The Internet tools they applied least were: webfolios/ePortfolios (5.5%), videoconferencing (5.5%), and MOO/MUDs (4.8%) (see Fig. 2). This is easily understandable as most teachers lacked skills with MOO/MUDs (20.3%), webfolio/ePortfolio (20.9%), and natural language processors (25.4%). Fewer teachers applied videoconferencing in their instruction because of the availability of equipment and the time difference between Taiwan and the UK or the USA.

Interestingly, the above three most frequently used tools (see Fig. 1) were not included in the six most valid tools revealed in the SEM analysis (see Section 4.5). For these six tools, the descriptive analysis showed that presentation software is an Internet tool that teachers applied most (46.3%). However, only about one-third applied discussion boards (30.5%) and digital audio (36.3%). A majority of them did not apply Web page development (21.2%) and authoring software (15.1%) (see Table 1). Furthermore, while many institutions either purchased or created course management software, based on the qualitative findings, only 12.9% of these teachers applied this tool. It is suspected that those who did not use these tools may not have the skills, interest, or time to learn this software or to create materials.

The 249 teachers who applied these Internet tools in their instructional practices used these tools in various curricular areas; however, they tended to use the Internet tools more in listening and reading courses. Almost half of these teachers applied Internet tools in teaching listening and reading courses, 49% and 52%, respectively. More than one-third of these teachers used Internet tools for teaching writing (35%) and culture (35%) and almost one-third used these tools for vocabulary teaching (32%). About one-fifth used Internet tools for teaching speaking (25%) or grammar (21%) and for teacher development courses (20%). These teachers used Internet tools less in curricular areas such as English for special purposes, pronunciation, literature, and translation. The curricular area where these teachers used the Internet least was.

<table>
<thead>
<tr>
<th>Internet tools and resources</th>
<th>Percent*</th>
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<tbody>
<tr>
<td>E-mail</td>
<td>69.5</td>
</tr>
<tr>
<td>Using browsers and search engines</td>
<td>67.2</td>
</tr>
<tr>
<td>Online dictionary</td>
<td>57.6</td>
</tr>
<tr>
<td>Presentation software (e.g., online PowerPoint)</td>
<td>46.3</td>
</tr>
<tr>
<td>Plug-ins + players for audio and video</td>
<td>45</td>
</tr>
<tr>
<td>Digital audio (e.g., MP3, Can-8)</td>
<td>36.3</td>
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<tr>
<td>Discussion boards</td>
<td>30.5</td>
</tr>
<tr>
<td>Chat/instant messaging</td>
<td>23.2</td>
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<tr>
<td>Online translators</td>
<td>23.2</td>
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<tr>
<td>Digital video (e.g., Web Cam)</td>
<td>21.9</td>
</tr>
<tr>
<td>Web page development (e.g., FromPage)</td>
<td>21.2</td>
</tr>
<tr>
<td>Authoring software (e.g., Hot Potatoes, Flash)</td>
<td>15.1</td>
</tr>
<tr>
<td>Weblogs (Blogs)</td>
<td>14.1</td>
</tr>
<tr>
<td>Online analytical tools (e.g., databases, statistical software)</td>
<td>13.5</td>
</tr>
<tr>
<td>Course management software (e.g., Blackboard, WebCT, Nicenet, Moodle)</td>
<td>12.9</td>
</tr>
<tr>
<td>Online writing assistance (e.g., Daedalus)</td>
<td>11.3</td>
</tr>
<tr>
<td>Wikis</td>
<td>10.9</td>
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<tr>
<td>Natural language processors (e.g., concordancers, parsers)</td>
<td>9.6</td>
</tr>
<tr>
<td>LISTSERVS</td>
<td>9</td>
</tr>
<tr>
<td>Voice over internet protocol (e.g., Skype)</td>
<td>7.4</td>
</tr>
<tr>
<td>Webfolios/ePortfolios</td>
<td>5.5</td>
</tr>
<tr>
<td>Videoconferencing</td>
<td>5.5</td>
</tr>
<tr>
<td>MOO/MUDS (multi-object orientation/multi-user domain)</td>
<td>4.8</td>
</tr>
</tbody>
</table>

*Responses obtained on the following five-point scale: 1 = don’t know about it. 2 = know about it but don’t know how to use it. 3 = know how to use it, but do not use it in my teaching. 4 = occasionally use in my teaching. 5 = frequently use in my teaching. The percentages refer to those who checked either “occasionally use in my teaching” or “frequently use in my teaching.” Total number of respondents: 311.
public speaking (6%) (see Fig. 3). Therefore, the quantitative area of this study showed that some curricular areas appear to be easier or more appropriate for northern Taiwanese EFL teachers’ Internet use, or, alternatively, that these teachers did not know how to apply the Internet tools in these least applied curricular areas.

Research Question 2: What are the factors that influence the use of the Internet by Northern Taiwanese EFL teachers in higher education institutions?

From the quantitative analysis, all the seven variables—teacher training, institutional support, perceived capability, attitudes, the constructivist thinking, and classroom pedagogy—have effects on Internet use. Teacher training appears to be the most prominent determinant of Internet use.

These teachers are more likely to use Internet tools or try innovative methods when they receive training. Their attitudes toward Internet use may change and result in subsequent behavioral changes after receiving training. In addition, once these teachers have positive attitudes toward Internet use, they would believe in the use of the Internet in teaching and learning, which affects their perception of their competence in using the computer and increases their use of the Internet in their instructional practices.

Once these EFL teachers’ beliefs are modified toward constructivism, teachers will implement constructivist-teaching practices, which affect and increase their use of the Internet in their instruction. When teachers have based their practices on constructivism, they will perceive themselves as more competent in computer use and such practices will reinforce their beliefs in Internet use for teaching and learning. Accordingly, it is easier for them to adopt innovative methods in instruction (Chen, 2006).

Based on the qualitative findings, there are several other factors influencing teachers’ use of the Internet unique to the Taiwanese educational context. These are: (1) to prepare for long-term university goals, (2) to create paperless environments, and (3) to use the instructional platforms most institutions provide. As a result, many teachers have had a head start integrating online learning into their current instructional practices.

Research question 3: What are the issues and barriers that these EFL teachers encounter when trying to incorporate the Internet into their instruction?

Thanks to the long-term objective of developing distance education, innovative and creative teachers have taken advantage of the facilities and infrastructures their institutions have provided and have been able to integrate Internet and technology use into their current instructional practices in various curricular areas as shown in both quantitative and qualitative studies. In fact, there exist large variations of institutional support among the higher education institutions in northern Taiwan. From the qualitative study, funding and incentives are crucial to implementation. While funding and incentives could encourage some or more teachers to make attempts, these teachers may not expand or continue their projects when their institutions provided only minimal financial support, as these teachers gave the relative value of invested time and efforts their careful consideration.

As all EFL teachers recognized the growing trend toward Internet use, the majority showed greater interest and were more willing to try it. Feelings of uncertainty, however, seemed to be a major barrier related to teachers’ attitudes, as ascertained from the qualitative findings.

Interestingly, time is not a distinct observed variable from the quantitative study, nor is “content.” They are, however, major issues for the active Internet users. The explanation for this may be that when teachers’ uses of Internet instruction are sophisticated and elaborate, they tend to realize what the problems of using the Internet are. Most teachers expressed that it was really time consuming to create online learning materials and activities. They all agreed that they spent more time preparing Internet-based materials than preparing course work from textbooks. In addition, while these teachers believe in the use of the Internet for teaching and learning, they need to know the appropriateness of course content for effective Internet implementation.

Most teachers lacked the opportunity for collaboration on technology-integration instruction. They need to exchange ideas and share their experiences and obtain emotional support from other teachers who also experience frustration. Their feelings of isolation may be a barrier to continuing their attempts at uses of innovative
approaches and tools. In this transitional and transformational period of educational reform, most teachers in Taiwan have heavy service, teaching, and research loads. If workshops on technology are not offered specifically for language teaching and learning, this non-specific content alone may discourage EFL teachers from further workshop participation.

The technology-related workshops that most institutions provided are for the long-term goal of distance learning. While the majority of these teachers have had head starts toward integrating online learning into their current instructional practices, long-term goals and planning for technology integration into classrooms are lacking.

Each teacher has to re-invent the wheel under the status quo. If each teacher only had to develop one part of the whole and all share, the workload would be significantly reduced for all. A central clearinghouse could facilitate this sharing. For example, if each reading teacher only had to prepare one webpage, and all shared with other universities, the curriculum for the entire semester could easily be covered.

6.1. Limitations

First, the total response rate (i.e., 35%) is still low even though mixed-mode surveys were employed. Use of a different survey mode may influence the participants’ answers to a particular question (Dillman, 2000). Second, this investigation is based on self-administered surveys and interviews rather than direct observation. If observational methods were properly and extensively used, they may avoid the possible biases and inaccuracies of self-administered surveys such as social desirability. In addition, an analysis of observations recorded on videotapes can yield precise answers to some questions (Gall et al., 2003). Third, the collection of data from interviews was confined to the teachers referred by other teachers, to a few acquaintances, or to a few who contacted the researcher and voluntarily became participants because of their interest in the current research after doing the survey.

6.2. Future directions

Accordingly, more qualitative studies should be conducted to explore how language teachers in various curricular areas integrate the Internet into their instructional practices. Their designed or applied instructional strategies pertaining to the development of Internet-based language instruction need to be explored in depth. Observation would be another technique that could allow researchers to identify directly and distinctly teachers’ actual instructional strategies, to further realize teachers’ problems in Internet-integration instruction, and to probe the potentiality of future development.

7. Conclusion

Continuous professional development would facilitate efficient and successful implementation of Internet use in language instruction. It would allow teachers to learn from and exchange ideas with others, and to further seek opportunities to collaborate. Ongoing professional programs or workshops should not be techno-centric only. Teacher educators should not only provide technology knowledge but also connect technology knowledge to pedagogical knowledge, content knowledge and even pedagogical content knowledge (Zhao, 2003). Continuous professional programs should be unique to language instruction and meet the needs of language teachers.

A vision and comprehensive plan specifically for technology integration into instruction is necessary. Institutional support is crucial in the promotion of technology integration and the development of online materials and websites. Administrators need to efficiently and carefully budget for the essential expenditure on hardware and software and provide necessary and appropriate support for language instruction. An inefficient classroom discourages teachers’ intents and enthusiasm. Institutions should provide more incentives and funds to support teachers, along with actual technical support.

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