

Understanding language teachers' practice with educational technology: a case from China

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ABSTRACT

This article explores how eight secondary school teachers integrated educational technology into English language teaching in Beijing, China and considers their views of the factors influencing technology use. Analysing data from classroom recordings and follow-up interviews, this study revealed that PowerPoint was the most frequently used technological application in the classroom, while the internet and other technological tools were also used by the teachers. They employed educational technology for different pedagogical purposes, including addressing professional needs in improving teaching, designing materials and conducting professional development. Teachers also claimed that they used technology to address learners' needs, such as improving engagement, enhancing language acquisition, facilitating understanding and establishing a context for language use. The study identified four important factors in influencing teachers' use of technology, including sociocultural contexts, teachers' beliefs, access to resources, and technology competence and confidence. This study suggests that a critical reflective approach is useful in assisting teachers to understand their needs and pedagogical beliefs concerning technology use. Ongoing professional development is also valuable in promoting teachers' technology competence and confidence, thereby improving the use of technology in their teaching.

Key words: technology use, teachers' perceptions, China, case study, socio-cultural context

INTRODUCTION

Computer technologies play a significant role in educational reform and curricular innovation, and teachers around the world have been encouraged to integrate technology into their teaching (Baek, Jung & Kim, 2008; Pelgrum, 2001). One fundamental argument underpinning this drive is that when teachers engage in applying technology in their teaching, it will benefit students' learning. Research suggests that realization of the full potential of technology in education depends on how teachers use the technology (Cabanatan, 2003), and on the skills and attitudes they have regarding the effectiveness of technology integration into the curriculum (Bitner & Bitner, 2002). However, language teachers are still reportedly slow

to adopt computers or use them productively in language teaching (Li & Walsh, 2011; Yang & Huang, 2008). Therefore, it is important to understand technology use and influential factors in technology uptake from the perspectives of teachers in order to facilitate the process of technology integration. So far, most of the research conducted in this area has focused on which technological tools have been adopted by teachers, their beliefs about technology use and the factors contributing to this (e.g. Yang & Huang, 2008). Little attention has been paid to how technologies are embedded in teaching, even though it is widely believed that understanding how teachers use technology for teaching is crucial for developing effective computer assisted language learning (CALL) pedagogy and materials (Chapelle, 2003). Against this background, the present article focuses on how language teachers integrate technologies in teaching at different stages of a lesson and what factors influence their use of technology.

LANGUAGE TEACHERS AND TECHNOLOGY USE

A review of the literature on language teachers and technology use suggests that most studies focus on the following two issues: teachers' beliefs about and attitudes towards technology, and technology uptake.

The first type of study centres on language teachers' beliefs about technology in classrooms and the factors influencing teachers' use of technology (e.g. Lam, 2000). A possible rationale for such work has been the view that initiatives to promote technology uptake in teaching are more likely to succeed if teachers' attitudes and concerns are understood and the potential contributing factors are considered. The literature indicates that teachers' beliefs about the potential outcome of the usage or the perceived usefulness of the technology and its ease of use are crucial factors influencing their willingness to employ technology. This has been termed the Technology Acceptance Model (TAM, Davis et al, 1989). The model implies that if teachers perceive computer use to be important in enhancing teaching and learning, they will have a positive attitude towards using technologies in teaching. A positive attitude consequently results in technology use. TAM is undoubtedly useful in researching technology attitudes and has been widely applied in different contexts. However, research suggests that teachers' decision-making processes in technology uptake are more complicated than this model suggests. For example, apart from technology usefulness and ease of use, there are many interrelated issues (both psychological and physical) that can conceivably influence teachers' actions (Li, 2008; 2011). In the literature, the most widely reported influences on

teachers' use of technology are external factors such as resources, training, technical support and the availability of time; much research has suggested that teachers are often frustrated by these factors. Yang and Huang (2008), for example, surveyed 332 EFL (English as a foreign language) teachers in Taiwan and concluded that the main barriers that made integration difficult, or even impossible, to achieve were a lack of preparation time, instructional design abilities, appropriate training, personal guidance and consultancy, and suitable instructional software. Other researchers have reported similar findings to highlight the external factors influencing the use of technology for instructional purposes (see, for example, Egbert et al. 2002). Besides resources, technology competence and confidence are important factors. Teachers are not prepared to integrate technology in their teaching if they do not see themselves as being confident and competent in technology. For example, Thao (2003) reported that EFL teachers in Vietnam were not confident in giving proper instructions, designing activities and solving the problems that occurred in teaching when they used computers in their teaching. Lam (2000) reported a similar result that American ESL (English as a second language) teachers lacked confidence in computer skills and knowledge about teaching through computers. Another important factor influencing teachers' uptake of technology is pedagogical beliefs. Pedagogical beliefs are associated with what teachers think, believe and do in instruction, which influence their acceptance and uptake of new approaches, techniques and activities (Donaghue, 2003). Li (2008) surveyed 450 EFL teachers and found that pedagogical beliefs play a more important role than external factors in teachers' use of technology in teaching. Lam (2000) reported similar findings in L2 classrooms in America – teachers' beliefs about the usefulness of technology influence their uptake of technology.

Based on the above discussion, teachers' technology uptake is influenced by different factors and therefore, an enhanced TAM needs to incorporate both psychological and physical contexts in which technology users find themselves practising. In short, factors affecting technology use might include the various elements presented in Figure 1.

INSERT FIGURE 1 HERE

The second type of study on teachers' use of technology investigates what type of technology is used and the purpose of using it. In one such study, Meskill et al (2006) surveyed 847 K-12 ESOL teachers regarding their uses of technology and found that the most frequently used

software is Word processing; a finding that resonates with the results of two national surveys by Becker (2000) and Doherty and Orlofsky (2001). Li's (2008) survey of English teachers suggests that PowerPoint is regarded as the most popular and appropriate form of technology used in Chinese language classrooms to give students a different learning experience from the traditional one. In short, technology is mainly used for teaching preparation and instructional delivery following the traditional model (Li & Ni, 2001; Zhong & Shen, 2002). These studies shed light on the use of technology in language teaching but very little attention has been paid to *how* teachers use technology in teaching to address their pedagogical goals. The tension between the increased policy attention to technology integration and the add-on approach to technology use suggests a need for further studies to explore how and why technologies are used from teachers' perspectives. Chapelle (2003) suggested a useful approach to understanding technology use is to observe *how* it is used. A close look at how technology is employed to support language teaching and learning should shed light on research in CALL, in particular in the area of pedagogy, materials development and policy making.

ENGLISH LANGUAGE EDUCATION IN CHINA

In China, English is a compulsory subject in formal education and has become a requirement for both school and university entrance examinations. English examinations play a crucial role in students' education as soon as they begin school life (Qi, 2004) and the washback of tests on teaching methods and students' approaches to learning is widely observed in research (e.g. Xiao, Sharpling & Liu, 2011). In such a context, English classes are often teacher-centred, textbook-directed, and exam-oriented. The teacher and text-book are the main language input and most teaching focuses on linguistic knowledge (such as grammar, lexis and phonology). The consequence is that both teaching and learning results can be unsatisfactory.

In 2001, the Ministry of Education (MoE) issued the New Pilot Paper of National English Language Curriculum Standards (hereafter, the Pilot paper) to highlight the need for language use for communicative purposes. This requires that EFL teaching in China should focus on promoting exploratory, participatory and collaborative learning to enhance students' communicative and intercultural competence. In particular, the English classroom should be more student-centred and communication-oriented. As a result, educational technology may facilitate teachers to change their pedagogical practices in this direction. The Pilot paper stipulates that teachers should fully use technology, specifically the internet, local intranets

and courseware, to enrich teaching content, to explore new teaching methodology and to facilitate independent learning (MoE, 2001, 1-9 'ELA' 4.1.6). One particular area, which the Chinese government has been emphasizing, is to use technology to develop students' intercultural awareness (Wang & Coleman, 2009). At a policy level, the government published long-term goals for Chinese 'educational informationization' by 2010, with the aim of getting every school connected to the internet and making a smooth integration of computers into the school curriculum (Huang, Jiang & Zhang, 2007). At the time, 85% of the primary and secondary schools in the developed area of China had the level of infrastructure development and technology application matching that of developed countries (Chen, 2003). National projects were set up to enable all primary and secondary schools to have access to the internet, to develop students' and teachers' technical skills, and to facilitate the integration of technology in teaching. This increased policy attention to technology resulted in the growth of multimedia EFL classes in China (Zhong & Shen, 2002). Despite these efforts, little is known about *how* teachers embed technology in foreign language teaching to address their pedagogical needs and facilitate learning.

METHODOLOGY

In light of the need for more research on how and why Chinese teachers use technology in language teaching, the present study explored the following research questions:

- How do Chinese EFL teachers integrate technology in their teaching?
- What influences their integration of technology in their teaching?

This study adopted a case study approach to explore teachers' beliefs and practice in depth and within its real-life context (Yin, 2009). Here, the case is technology uptake in Beijing secondary schools. Given that the aims of the current study were to describe and analyse a group of teachers' practices and perceptions, classroom recordings and follow-up interviews were identified as appropriate data collection methods. The starting point for utilizing classroom recordings was that they provide opportunities to examine how technologies were used at different stages of a lesson. Follow-up interviews were used to gain further insights into how and why teachers used technology in this context.

Participants and procedure

Eight teachers were purposefully selected from a list of volunteer teachers who had been part

of a larger project (Li, 2008). The participants were selected from the volunteers on the basis of a number of factors¹ such as gender, age, school location, school category, teaching experience, CALL experience and the level of the students they taught. Informed letters with explanations of the purposes and procedures were fully distributed and consent was sought from all parties concerned. It is worth noting that the researcher's prior work experience in Beijing had helped to gain the trust and cooperation of the participants, and importantly, their empathy in the pursuit of the research goals.

Table 1 illustrates details of the participants (pseudonyms are used to ensure their privacy). Although the schools' policies in integrating technology varied, the school leaders (principals and senior management teams) were all motivated to encourage the teachers to implement technology in their practice in response to the new curriculum requirements (MOE, 2001). As a result of technology-enhanced curriculum reform in 2005 in Beijing, all participating schools were well-equipped with computers and connections to the internet or to an intranet in offices, classrooms and designated areas (for example, computer suites) and all teachers were equipped with a computer for teaching purposes.

INSERT TABLE 1 HERE

Data were collected over a period of two months through video recordings of classroom observations and follow-up interviews. The data collection took two months. Each teacher was observed teaching ten 45-minute classes over the course of one week and a semi-structured interview at the end of the week. The interview focused on the following aspects:

- their understanding of using technology;
- their opinions and views of technology integration in schools and curricula;
- how they perceive technology knowledge and skills for technology integration in class;
- their views on the innovations and benefits that technology brings to schools;
- their experience of and concerns about using technology in teaching;
- the support they would like to receive.

The interviews varied in length from 30 to 60 minutes and were digitally recorded for qualitative content analysis. The interviews were conducted in Chinese to avoid language difficulty and misunderstanding. During the study, participants were assured of their anonymity in all data usage and of their right to withdraw at any time.

Data analysis

In analysing the lesson recordings, the initial focus was on describing how technology was used at each stage of a lesson. These descriptions were then analysed to generate a number of common themes around the role of technology in the observed processes of teaching. Table 2 illustrates how the activities and the role of technology were analysed in relation to five conventional stages of a lesson: lead-in, presentation, practice, consolidation and conclusion. For example, in the lead-in stage, PowerPoint was the main technology application used to display images and texts. In the next step of the analysis, the pedagogical aims were analysed. The top three purposes of using images and texts in the lead-in stage were presenting (introducing) the topic, checking students' understanding, and reviewing. The remaining stages of the lessons were analysed by the author following the same procedure. In the findings, technology use in classroom is presented with examples from four stages (lead-in, presentation, practice and consolidationⁱⁱ). Technology use outside the classroom was also considered through the teachers' interviews.

INSERT TABLE 2 ABOUT HERE

The interview data were processed through the procedures of transcription, coding, data clustering, theme generating and conclusions. First, the data were fully transcribed verbatim in Chinese and only those extracts selected for use were translated. To ensure the quality of the transcription and translation at a later stage, a second opinion was sought from a Chinese-English bilingual researcher. In line with good practice on respondent validation, the transcription of each interview was sent back to the teachers to check. Then the author read the interview transcriptions many times in order to build an appropriate indexing and labelling system, coded according to the major literature topics presented in Figure 1, and the research questions. The goal was to understand what factors influence individual teachers' use of technology. After the initial codes were established, the interview transcripts were categorized and then grouped into sub-themes, which concentrated items around common issues (e.g. training, resources). These were then further collapsed to generate the substantive main themes, namely: motivating factors and concerns. In the data presentation below, the findings are reported from two aspects: perceptions of motivating factors and concerns. Last, analysis and interpretation were conducted by comparing the interview guidelines and research questions to draw conclusions.

TECHNOLOGY USE IN TEACHING

Classroom recordings, the author's observations and teacher interviews were used to highlight how technology was used in teaching. Technology was reported to be used with

different frequency in the eight classrooms. Two teachers used computers only for demonstration lessons, while the other six incorporated them in their daily teaching. Nevertheless, distinctive as they were, computers and the internet were utilized in the following practices: improving lesson presentation, creating customized materials, participating in professional development, engaging the students, enhancing linguistic and conceptual understanding and creating a context for language use.

Improving lesson presentation

During the majority of class time (80% of the recordings), teachers used PowerPoint to present images, texts, explanations and exercises for language systems (phonological units, vocabulary, grammar and discourse) to improve lesson presentation. Table 2 above presents the typical use and functions of PowerPoint at different stages of the observed teaching sessions. What is striking from the table is the extent to which PowerPoint is used as a tool to present learning content; presenting lesson content in this way is by far the most frequent use of PowerPoint.

Turning now to some classroom data, the following snapshots show that teachers used PowerPoint as a medium to display content, especially when the learning focus is on acquiring linguistic knowledge.

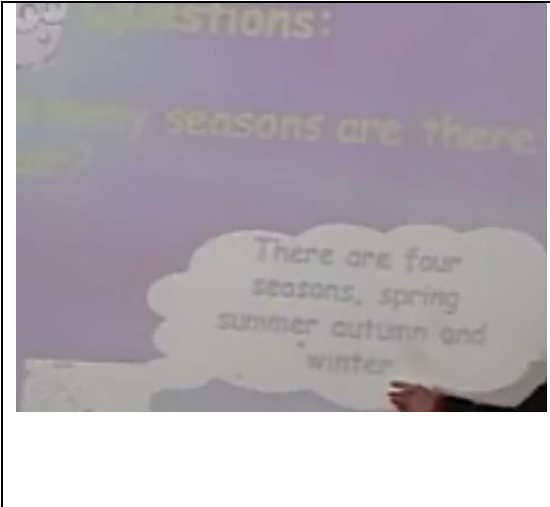
Snapshot 1

	<p>T: now we will, let's look at some important phrases, some important phrases. Now look at the board, the first one provide for, provide for (emphatically). Now take notes in your book, take notes (emphatically).</p>
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Snapshot 1 was taken from the presentation stage in Yang's class when he was teaching vocabulary. Yang was using PowerPoint slides to present learning content. While he was referring to the target language on the PowerPoint slide, he emphasized the importance of taking notes for learning with an emphatic repetition of 'take notes'. This controlled and structured way to use PowerPoint to present teaching content was also observed in other

classes. For example, Ling from a junior secondary school also used PowerPoint to teach vocabulary, as illustrated in Snapshot 2. Again, the PowerPoint slides were used as a tool to present the teaching content at the presentation stage. More specifically, Ling used the slide to help the learners to follow her instruction, and possibly link the pronunciation to the spelling of the target vocabulary. In Ling’s class, repetition appeared to be a useful way to learn. It is clear that in these language classrooms, using PowerPoint to improve lesson presentation is also a means for teachers to regulate pace and content (Kelly et al. 2013).

Snapshot 2

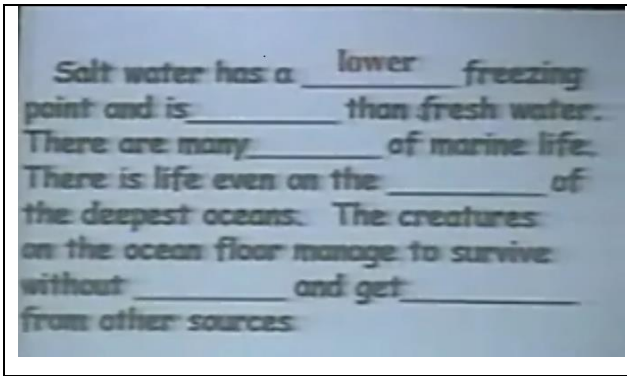
	<p>T: Now read after me. There are four seasons spring, summer, autumn and winter</p> <p>SS: There are four seasons spring, summer, autumn and winter</p> <p>T: winter</p> <p>SS: winter</p> <p>T: winter</p> <p>SS: winter</p> <p>T: now listen carefully. There are four seasons spring, summer, autumn and winter</p>
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Creating customized materials

All the teachers used technology (mainly the internet and courseware applications) to create customized materials. This includes adding supplementary language materials and constructing tasks, for example true or false questions, matching activities and gap filling.

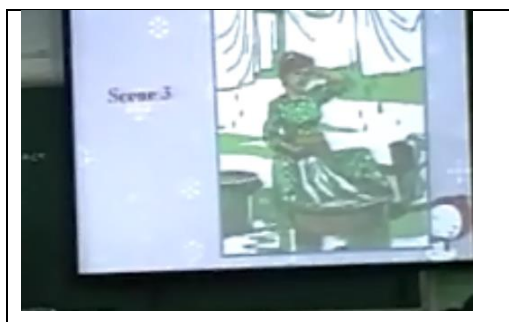
Snapshot 3 was taken from the consolidation stage in one of Rong’s classes where she used a PowerPoint slide to show the reading comprehension exercises to guide students in extensive reading and to display the correct answers later on.

Snapshot 3

	<p>T: now, I have a gap filling exercise for you. Based on your understanding of the passage, fill in the blank.</p>
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In addition to creating exercises like this, visual and audio materials were widely used to supplement textbooks. In Snapshot 4, Tang showed students a video made by other teachers as a lead-in for a reading activity. Similarly, Fang used music in his class as a listening comprehension activity. Again, it suggests that while PowerPoint was used as a presentation tool, other forms of technology (such as video and the internet) were embedded in the slides as a means of enhancing and extending learning.

Snapshot 4

	<p>T: now before we read further, let's watch the scene 3, scene 3.</p>
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Participating in professional development

All eight teachers used various forms of technology for their own professional development purposes. This was achieved through collaboration in lesson preparation, sharing materials and researching new ideas for teaching. This is one of the major themes emerging from the interview data when teachers talked about using technology outside the classroom. All eight teachers reported that they used the internet to gather teaching materials, collect ideas, and identify suitable lesson plans and PowerPoint presentations, and to explore the courseware that came with their textbooks. From the same data, it is apparent that it had become a shared practice to upload their own materials and PowerPoint presentations to an online teacher forum for other teachers to use. Email and online forums were especially regarded by these teachers as an effective method for communicating and collaborating with other teachers.

Improving student engagement

It was observed in all the classes that teachers used technology to motivate and engage learners. Images, audio (e.g. music) and videos were frequently used, in particular in the lead-in and presentation stages. Snapshot 5 was taken from one of Cai's classes at the presentation stage. Cai used pictures of Loch Ness to distinguish fact and fantasy and to raise student interest in the topic. As shown in the classroom transcript, students immediately engaged in discussion when Cai displayed the picture. For example, in the extract below, students show interest in the slide (discussing in a low voice) and demonstrate engagement through their attempts to answer the teacher's question. In addition, having the slide in front of students enabled teachers to easily ask a more complicated question (Loch's monster, is it fact or fantasy?)

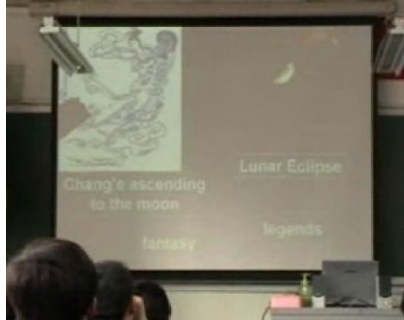
Snapshot 5

	<p>(showing a PowerPoint slide of the Loch Ness monster)</p> <p>SS: (discussing in a low voice)</p> <p>T: what's that?</p> <p>S1: the monster of</p> <p>T: the monster of what</p> <p>S1: (in a low voice) lake</p> <p>T: lake yes is lake but we always use this word (writing loch on the blackboard) loch it's a Scottish word, Loch's monster, is it fact or fantasy?</p>
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Enhancing understanding

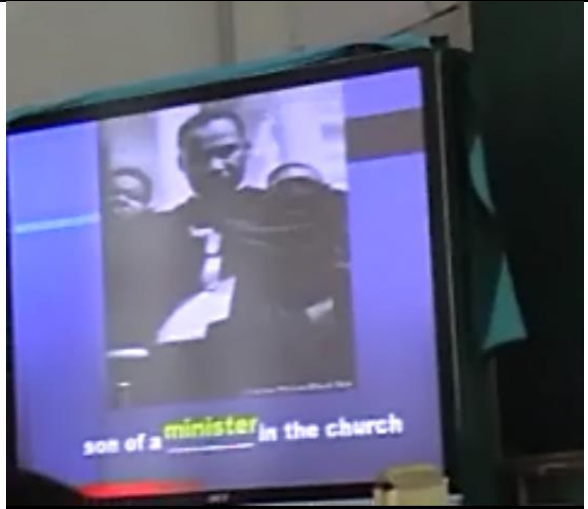
Four of the teachers used technology to enhance linguistic knowledge and facilitate understanding of new concepts. Snapshot 6 was taken from the lead-in stage of a class in which Cai used images of Chinese folk stories to distinguish the difference between folk story and fantasy. He pointed out that the well-known story about Chang'e was a folk story and asked his students to compare the meanings of fantasy and folk story. This was also based on shared cultural knowledge of the folk story between Cai and his students. Again, having the slide as a mediational tool helped Cai to ask the more complicated question 'what's the difference between fantasy and folk story?'

Snapshot 6

	<p>T: so Chang'e ascending to the moon, is it fantasy? What is it?</p> <p>S: fantasy</p> <p>T: it's a folk story, a folk story. Now what's the difference? Between fantasy and folk story?</p>
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At a different stage of a lesson shown in snapshot 7 (presentation stage), Mei was using a picture to teach the new word 'minister' which was not an easy task due to the limited background knowledge of her students. With the help of the image, Mei successfully helped students to understand the meaning of 'minister' (one student in the snapshot displayed understanding by translating the vocabulary into Chinese, i.e. shenfu). Meanings of unfamiliar words are frequently mediated through the use of PowerPoint images in this study.

Snapshot 7

	<p>T: Minister do you know minister?</p> <p>SS: (2 unintelligible)</p> <p>T: louder do you know? Lining do you know minister?</p> <p>S: no idea</p> <p>T: you have no idea. Is there anyone else do you know? (displaying the image) Church? Church? Ok what kind of job</p> <p>S: shenfu (translation of minister)</p> <p>T: yes, you've got it you got it</p>
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Providing a context for language use

Two teachers used technology to provide a context for students to use the language. One teacher, Mei, at the consolidation stage of her lesson, showed pictures of Martin Luther King's birthplace and his family background, as well as a list of key words to establish the context for students to talk about him. A similar use of technology was also observed in Ai's classes. At the consolidation stage of one lesson, Ai provided students with information about

weather in different cities to help them practise talking about the weather. In these classes, technological tools were used to create a context for students to engage in language use and to promote opportunities for learning.

PERCEIVED FACTORS INFLUENCING TECHNOLOGY USE

There are different factors influencing teachers' use of technology and the analysis of the data presented two major themes: motivating factors and concerns. Factors in each category are presented in Figure 2. The extracts from the teachers' interviews have mostly been chosen to represent majority perceptions and opinions and are translations. The teachers are identified by their pseudonym and the specific comment is numbered for each participant for example (Cai 22).

INSERT FIGURE 2 ABOUT HERE

Perceptions of motivating factors

The primary reasons for teachers to use technology in their teaching were dissatisfaction with their current teaching, perceived benefits of the technology, expectations from colleagues and school leaders, availability of training and technical support, and access to computers. As discussed below, these factors are linked to teachers' pedagogical beliefs, sociocultural context, technology competence and confidence, and access to resources.

Teachers' pedagogical beliefs

Teachers' pedagogical beliefs about the usefulness of technology are an important factor. The 'usefulness' refers to improving teaching methods, facilitating understanding, achieving a high level of effectiveness, and motivating learners. Specifically, the teachers believed that technology can change or improve their teaching. All of the teachers were in general dissatisfied with their teaching, which they described as 'linear', 'boring', 'very predictable' and 'mechanical', signalling a concern with the appropriateness of teaching methods in current EFL classrooms. They agreed that they were seeking an alternative 'interesting', 'vivid' and 'interactive' approach and seemed to expect that the use of technology could change their teaching. Ling commented that:

The old teaching methods and lessons are like dead trees, so we are hoping to bring them to life through technology. (Ling 27)

The teachers also believed that technology could benefit learning with all of them agreeing

that using computers (to present images) could facilitate better understanding of texts, vocabulary or concepts. For example, Cai reflected on his teaching and suggested ‘using animations or images to help students understand difficult vocabulary or concepts’ (Cai 22). The teachers also believed that using computers could help achieve higher effectiveness in class, which they interpreted as ‘presenting more language examples so that students can learn more’ (Ai7). Teachers consider grammar and vocabulary as the most important components in language learning, and ‘PowerPoint can assist them to present a lot of examples’ (Ai 2). All of the teachers appeared to agree that they could deliver a better version of what was essentially a knowledge-transmission lesson. Teachers attach much importance to the traditional knowledge-transmission approach to achieve academic attainment, and technology was identified as the most effective way to foster students’ knowledge. For example, Cai explained this view:

When students have enough vocabulary and solid grammar knowledge, they will be able to read passages without difficulties and achieve high marks in writing. That means they can use English fluently...the most effective way is to pass this knowledge to students by lecturing. (Cai 6)

Technology was also seen as a tool to motivate and engage students. From the teachers’ perspectives, the computer is a ‘novel tool to deliver lectures and to retain the students’ interest and attention’ (Ling 2). The influence of technology on affective aspects of learning was well acknowledged by all these teachers, as they believed that ‘students are more engaged in learning’ (Ai 2) and ‘are happier to learn’ (Fang, 17).

Sociocultural context

One particular sociocultural factor, support and recognition from school leaders, was identified by all eight teachers as another motivating factor for using technology. This factor highlights emotional, technical and financial considerations. On the one hand, teachers felt encouragement from school leaders because using computers in teaching was perceived to be ‘open-minded, innovative, creative and current with teaching methods’ by their principals (Cai 26). More importantly, teachers felt encouraged because ‘the principals do not assess (their) lessons using traditional criteria’. (Cai 26). On the other hand, heavy financial investment and technical training provided these teachers with support in using computers. Teachers were provided with ‘training, courseware and software, with opportunities for attending workshops and observing fellow teachers’ lessons’ and even ‘a (free) laptop to use

in teaching'. (Rong 22)

To some expert teachers, expectations from local education authorities and fellow teachers was another important factor. Ling reflected on her experience of using technology to explain that she only used computers when she had an observed lesson. In essence, there are two major drives for her to use technology: first, there is a shared belief about the role of technology in a good lesson and 'it's almost a fixed rule that an observed lesson without computers is not a good one'; second, as a subject expert teacher, she assumes 'responsibility to set an example to early career teachers' (Ling 28).

Technology competence and confidence

Teachers' competence and confidence in using technology appeared to be a key element of technology integration in the curriculum. The training offered by schools and local education authorities accelerated the development of the technology infrastructure, and to some extent boosted the teachers' technology competence and confidence. In Mei's opinion, 'even those who had never touched computers before started to use them in their teaching' (Mei 12).

Access to resources

The availability of technology, which is one of the external factors, motivated teachers to experiment with it in their teaching. In the case of Rong, 'all offices and classrooms are equipped with computers and connected to SchoolNet and the internet', and she felt she needed to exploit the technology in the hope of 'adding something interesting to teaching' (Rong, 21)

Concerns about using computers

Despite being highly motivated to use educational technology in teaching, these teachers did raise a range of concerns in three main areas: access to resources, technology competence and confidence, and exam pressure. It is interesting to note that these teachers seemed to be happy about the technology-enhanced knowledge-transmission pedagogy.

Access to resources

Resources include computers for student use, courseware and time. Having computer access motivated teachers to use technology, but a lack of computers for student use was reported as a barrier to adopt a learner-centred approach in teaching and getting learners involved. Five

teachers shared the concern and reflections were generally around access to computer suites for teaching purposes. It was a common practice in those schools that only 'ICT courses are allowed to use computer suites' (Tang 1). Teachers expressed enthusiasm in learner-centred approach to teaching, for example, 'letting students get on computers' (Tang 1) or 'organising students to do projects' (Ai 5).

Not having access to appropriate software, courseware, or electronic resources was another factor which inhibited the teachers' use of technology. The teachers agreed that they lacked appropriate CALL materials and therefore developing courseware had become an essential but difficult task for them. It was obvious from the observations that one of the major activities for which the teachers used technology was to create materials. However, Ai suggested exercising cautions:

It is too time-consuming and very often I can't realize the idea that I intend to. After all, I don't have very good technical skills. (Ai 8)

Although the teachers were aware of the availability of existing CALL materials, they still considered it necessary to develop their own electronic resources because they believed that existing CALL materials were 'irrelevant to the textbooks' (Cai 18). Cai also clarified that what was important in using technology was not simply the matter of developing more materials but rather, enhancing their skills of evaluating existing materials, especially in the area of 'assessing the courseware to match the textbook' (Cai 19).

Technology competence and confidence

Although the teachers demonstrated knowledge and skills in using technology, they displayed a lack of competence and confidence in their reflections. Again, for these teachers, technical training seems to be a prerequisite for technology use in teaching. Teachers will not be confident and comfortable using computers unless they feel they are capable of coping with common technical problems. Mei reflected on a frustrating technical crash and suggested that 'more technical support in class would be useful' (Mei 21)

Exam pressure

Teachers felt less confident about the effectiveness of technology in terms of improving test results, which they saw as their primary role in serving the students. For these teachers, 'the score says everything' (Ai 22) and their primary priority was to 'coach students to get good

results' (Ling 15). Six teachers mentioned exam pressure as an important factor influencing the way they used technology. Because teachers placed emphasis on helping students to achieve good results in exams, they considered technology as a distraction sometimes, as Cai commented:

Students pay more attention to images rather than the content, so they might see the key language points but won't remember them. (Cai 24)

For these teachers, remembering contents is important and although using PowerPoint could improve the presentation of the teaching content, motivating learners and maximising exposure to the language, teachers were less convinced of its effectiveness in improving students' achievements. Cai clarified the possible mismatch of effectiveness of technology and reality, commenting:

There is no evidence that computers really help students learn English when it comes to tests although the quantity of input can be enhanced. The problem is there is a mismatch between theories of computer assisted language learning and what we test. That's one of the reasons why my colleagues are not motivated to use computers in teaching. (Cai 23)

Time constraints, imposed largely by the existence of high-stakes exams, mean that it is inevitable that teachers use all the time they have to train students to get high grades. All the teachers in the present study expressed frustration at not having enough time as they felt 'technology takes away teaching time' (Rong 20), especially due to technical glitches. Even when lessons ran smoothly, they reported that 'preparing lessons (e.g. searching and creating materials) can also take a substantial amount of time' (Fang 6).

DISCUSSION AND IMPLICATIONS

This study investigated how a sample of teachers used technology in their teaching and what factors influenced their use of technology. The discussion below is organized around two key issues which emerged in response to the research questions: (i) technology use in teaching; and (ii) factors contributing to technology use.

Technology use in teaching

Findings suggested teachers used different technological applications in teaching to address their pedagogical goals. Although PowerPoint was the main technological application, teachers used it with different pedagogical considerations. In a nutshell, teachers used

technology to address both teachers' and learners' needs, and this finding is in line with previous research (e.g. Ottenbreit-Lefwich, 2010). Teachers used technology to address their professional needs in the areas of improving lesson presentation, creating customized materials, and participating in professional development (e.g. searching for information for teaching and sharing ideas). This result is similar to the outcomes of research by Ruthven, Hennessy and Deaney (2005) and Ottenbreit-Lefwich, et. al (2010), despite the different disciplines of the teachers in those studies. The present study has also indicated that teachers engaged in material searching, developing and sharing, which mirrors research reported in Wang and Coleman's (2009) study: most activities were limited to information searching, using online audio-video and graphic resources, online reading and so forth. However, the present study also revealed that physical transformation of the classroom is closely related to teachers' pedagogical considerations, and the technology indeed performs different roles at different stages of a lesson. Although teachers mainly use PowerPoint for presentation, they use it with different pedagogical considerations and therefore, the use of technology is complex.

It is worth noting that materials play an important role in foreign language teaching and designing appropriate teaching materials to meet specific subject needs is vital. The advantage of the internet in offering authentic and multimodal resources is highly appreciated by teachers. This information search is essential in integrating technology in teaching and only through engaging in various materials do teachers develop their skills in evaluating the appropriateness of resources. Chapelle (2003) comments on the shortage of frameworks for evaluating CALL materials and I would argue that a practice-based CALL materials evaluation framework is desired and could be developed through teachers' exploration of materials for their own context. Using technology to engage in professional activities empowers teachers in integrating technology. Sharing their experience with other teachers using technology could be seen as one form of online professional development (Dede, 2006). This could also contribute to establishing a community for professional development where teachers can develop their skills in evaluating materials and selecting appropriate materials to meet their pedagogical purposes with other teachers who share the same interests and pedagogic considerations (Sahin & Thompson, 2007). Because teachers rely on technology to support their professional needs (Judson, 2006), understanding teachers' needs in technology use and their perception of the role of technology in language teaching is crucial in encouraging teachers to integrate technology in the curriculum.

The present study also suggests that the teachers used technology to address learners' needs. First of all, PowerPoint was considered as a preferred tool to offer students a different learning experience and to engage them more actively. The motivating effect of technology is well observed in the literature and technology is considered as primarily an affective tool by language teachers (e.g. Braine 2004). Second, the teachers used technology to enhance linguistic knowledge and understanding and this constituted a major part of each lesson. The way technology was used is strongly associated with a traditional perspective of teaching and learning language as a process of acquiring linguistic knowledge. This finding highlights the proposition that traditional views of teaching and learning constitute an important obstacle in attempts to change normal patterns of classroom practice. Challenging these beliefs must therefore become a major goal in any educational reform movement, and should be given high priority since the ways in which teachers use technology plays an important role in determining the extent to which the full potential of technology can be realized (Cabanatan, 2003). What the current study offers is an exploration of the ways in which technology is used in the moment-by-moment unfolding of a lesson. More research investigating *how* teachers use technology to achieve their pedagogical goals is needed in order to understand the relationship between teachers' pedagogical beliefs and the role of technology in their teaching.

Factors contributing to teachers' technology uptake

The findings of this study partially support the notion of TAM that teachers accept technology when they perceive it as having high usefulness and ease of use. However, teachers' decision-making in adopting technology is far more complex and involve various influential factors. Therefore, factors affecting teachers' technology uptake cannot be simply classified as 'external or internal' (Snoeyink & Ertmer, 2001) or according to 'usefulness' and 'ease of use'. Indeed, they form a complex interrelated chain, involving sociocultural context, teacher's pedagogical beliefs, resource accessibility, and teachers' technology competence and confidence (see Figure 1).

Sociocultural context

Sociocultural contexts play an important role in affecting teachers' use of technology. This includes the macro context, such as the testing system in China, and the micro context, such as the expectations of colleagues and school leaders.

Heavy pressure from examinations plays a central role in shaping whether and how teachers use technology. As illustrated in snapshots 1 and 3 the teachers used technology in a more structured way to focus on language knowledge, which is the outcome of teachers' pedagogical beliefs and the impact of the examinations (e.g. Ai, 22). This is particularly true in the case of the teachers who perceived technology usefulness to be low in assisting students to gain high academic results (e.g. Cai 23 & 24). The 'washback effect' of tests was considered to have a heavy influence on teaching methods and students' approach to learning (e.g. Xiao, Sharping & Liu, 2011) and this study further suggests that it exerts a powerful influence on the teachers' decision-making in how they use technology and to what extent they integrate technology in teaching. Thus, the success or failure of technology integration depends on whether the examination system is altered to reflect the proposed innovation with technology. One of the clear implications of this study is that teachers and policy makers need to be aware of the multiple assessments of learning and the need to move away from linguistic acquisition to developing students' interactional and intercultural awareness and knowledge as advocated in the Pilot paper.

The micro context, including schools as organizations and support from colleagues, was influential in teachers' use of technology. This finding contradicts the literature that top-down implementation of technology might cause resentment and avoidance from teachers (see e.g., Lam, 2000), but in a society where the expectations of others and the recognition of leaders is highly valued, support from school leaders and local education authorities is crucial. Recognition from the organization and colleagues was vitally important for the teachers in this study, as they saw it as a validation of their behaviour. This finding is similar to that of Wang and Coleman's (2009) study in a Chinese university, where it was confirmed that a teacher-led top-down approach is more appropriate to the Chinese context than a more learner-oriented western approach. Therefore, in designing technology integration, the sociocultural context needs to be taken into consideration.

Teachers' beliefs

This study suggests that teachers' beliefs about the usefulness of technology greatly influence the use of a particular technology, which confirms previous research (e.g. Ertmer & Ottenbreit-Leftwich, 2010). The perceived 'usefulness' of technology (e.g. improving teaching, facilitating understanding, enhancing teaching effectiveness and motivating learners) explains why teachers adopt a particular technology, and how it influences the ways in which technology is used in classroom practices. On the other hand, teachers' beliefs about the usefulness of technology inhibit them from fully integrating technology. As suggested in this study, while all of the teachers acknowledged the effectiveness of technology in improving the 'quantity and quality' of their input to students, they were dubious about the effectiveness of the computer in terms of improving learning outcomes. What teachers believe technology can do is constrained by the above mentioned sociocultural factor: exams. This study implies that there are three issues about teachers' beliefs worth considering in integrating technology. First, it is important to examine teachers' beliefs about technology use in relation to the context in which they work. Rather than trying to impose ideas of technology integration, teachers' own understanding about the usefulness of technology in their daily teaching needs to be understood and taken into consideration. Second, it is important to develop teachers' ability to evaluate resources and think critically about the usefulness (or the role) of technology in their own classroom in order to facilitate full exploration of the potentials of technology and to develop their own technology-enhanced pedagogy. That is, teachers should be encouraged to ask the question: 'what do I want to achieve by using technology and what is the best way to achieve my pedagogical goal?' The approach to research adopted in the present study might be one way in which teachers could engage in critical reflection, perhaps through the use of video clips as a way of evaluating technology use. This type of critical reflective approach to technology integration is vital. Third, it is important to raise teachers' awareness of the potential shifts in their roles in technology-integrated classrooms so that teachers can shift their thinking from an exam-oriented approach to a student-centred one.

Resource accessibility

The importance of schools which are well-resourced for technology use is highlighted as an important factor in this study. This result corroborates previous research findings (for example, Becta, 2004; Pelgrum, 2001). Nevertheless, how teachers use technology is restricted by the availability of computers, especially when they want to involve students.

One might argue that there are many effective uses of technology in any computer classroom (e.g. Tamela et al., 2000), but if teachers do not feel they have enough control over the work environment, they might not have the autonomy to be able to explore the environment.

Resource accessibility applies to relevant software, courseware and electronic resources. This study shows that the teachers developed their own electronic resources despite the widespread availability of published materials. Again, this is closely related to teachers' traditional view of teaching and learning and the belief of following the textbook rigidly. Because the teachers use the textbook as the guideline to assess existing CALL materials, they might not appreciate and understand the range of opportunities and activities that well-designed courseware might offer; there is therefore a need to consider enhancing teachers' capability to evaluate and adapt materials to their learners' needs (Chapelle, 2003).

Technology competence and confidence

The findings of the study suggest that technology competence and confidence are essential in integrating technology in teaching, which corroborates Thao's (2003) study. The findings have also highlighted that training is one of the most important means to improve teachers' competence and confidence, and such training needs to be ongoing and covering both technical and pedagogical aspects. Contextual factors, such as learning style, test, curriculum and culture should be taken into consideration, as teachers must see how to fit the technology into their teaching contexts. As teachers are more likely to incorporate technology that aligns with either their value beliefs (Ottenbreit – Leftwich et al., 2010; Zhao et al., 2002) or their students' needs (achieving high exam results in this case), professional development programmes are more likely to be effective if they are oriented to these beliefs or needs. Teachers will see immediate applications of such carefully tailored professional development programmes to their teaching situations to meet their students' specific needs. Technical support to maintain the smooth flow of a lesson was considered important by the teachers in this study, an observation that reflects a similar finding reported by Wang and Coleman (2009). It is reasonable to assume that teachers would be more likely to avoid using computers in teaching if they experience technical problems (Snoeyink & Ertmer, 2001). Supports at different levels are therefore important for teachers in the process of technology integration, especially technical support which enables teachers to learn in a 'hands on' way.

CONCLUSION

This research set out to address a research gap by investigating how a sample of Chinese language teachers incorporate technology in their teaching and what factors influence their decision-making. This study is limited by its small scale and by its context in a relatively well-developed area of China and its conclusions cannot be generalized to all Chinese classrooms. Nevertheless, through an analysis of video-recordings and semi-structured interviews, the findings suggest that although teachers by and large use PowerPoint and the internet, they have different pedagogical purposes. Technology was used by the eight teachers in this study to address both teachers' and learners' needs. Addressing teachers' needs meant improving lesson presentation, creating customized materials and engaging in professional development. Addressing learners' needs included enhancing understanding of linguistic knowledge and concepts, and engaging the students. Although the advantages of technology had not yet been fully exploited in the observed classrooms, the participating teachers had taken the first steps to integrate technology into their curriculum and teaching. The findings also highlight the need to examine how teachers use technology in a detailed manner rather than focusing on what technological applications are used by teachers. As indicated in the preceding discussion, *how* technology is used is closely linked to teachers' pedagogical beliefs and further research in this area is needed in order to understand the relationship between technology and pedagogy, and to promote technology integration. Different factors that influence teachers' use of technology in teaching were identified, for example, dissatisfaction with their existing pedagogical practice, the perceived potential benefits of technology, expectations from colleagues and school leaders, the provision of support and training, accessibility of appropriate resources and exam pressure. These factors fall into four broad themes: teachers' pedagogical beliefs, sociocultural context, technology competence and confidence and, resource accessibility. These factors are intertwined and might be applicable to other similar contexts. In summary, technology needs to be an integral part of the curriculum and not an add-on; teachers' pedagogical beliefs need to be addressed and sociocultural context needs to be considered; teachers need to have access to resources and ongoing appropriate training. If integrating technology is introduced as innovation, then teachers' own frameworks of teaching principles must be taken into consideration by providing them with appropriate pedagogical support in technology integration. Many of these issues remain problematic and one abiding conclusion is that much further research is needed in order to improve our understanding of how teachers can successfully integrate technology into the curriculum and their teaching, especially examining how technology is used outside the classroom.

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ⁱ In selecting participants, all teachers who had experience in using technology in classroom instruction were chosen and divided based on gender to make sure both male and female were included in the project. The next criterion applied was school location to make sure both rural and city areas were covered. Then teachers' teaching experience and age were used to further select participants

ⁱⁱ Note that although not all lessons followed the five stages as shown in Table 2, almost all of them contained the four clear stages: lead-in, presentation, practice (with consolidation) and conclusion