Chapter 15
Maximizing the Benefit of Technology for Language Learning

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15.1 Introduction

Since the advent of the information age, ongoing technological developments have significantly changed our lives. In educational settings, the prevalence of technology is also expected to bring about a revolution in learning and teaching. Governments and policymakers have injected significant amounts of resources, and support to promote the use of technology in schools. The use of information and communications technology (ICT) in learning and teaching processes is believed to benefit learners and learning in various ways and in a whole range of curriculum areas. This belief still persists although it is also known that some teachers are reluctant to use modern technology for teaching purposes and for some, ICT usage tends to be superficial (Yeung et al. 2012b). In this chapter, we focus on the use of ICT in language learning. We first identify critical issues related to the use of ICT in language learning and teaching, and then attempt to suggest possible ways to maximise the benefit of ICT application for language learning.

15.2 Technology in Twenty-First-Century Education

Governments tend to integrate technology into education for economic, social, and developmental purposes (Hawkridge 1990). From economic and social perspectives, it is necessary to highlight technology-related skills as an end in education since technology has become increasingly important for people to function

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in modern society as skilled members of the work force. From educational and developmental perspectives, technology has been widely introduced in educational settings worldwide as a means to boost students' learning outcomes and to promote educational innovations (Education Commission, Hong Kong 2000; Ivers 2003). In Australia, ICT capability has been listed as one of the seven general capabilities essential for living and working in the twenty-first century and thus needs to be covered in the National Curriculum as described by the Australian Curriculum, Assessment, and Reporting Authority (ACARA 2012c). To develop students' capability in ICT, ACARA has identified two approaches in the National Curriculum. The first approach emphasises a 'technologies' curriculum which covers two subjects, namely design and technologies and digital technologies. This emphasizes treating ICT as a discipline which is to be explicitly taught in formal education (ACARA 2012c). The second approach places an emphasis on 'using technology as a tool to search for, organize, evaluate and communicate information, and the possession of a fundamental understanding of the ethical/legal issues surrounding the access and use of information' (Partnership for 21st Century Skills 2007, p. 1). This approach is materialised through an infusion of ICT techniques and applications in all learning areas of the National Curriculum, by encouraging the use of ICT for tasks such as 'conducting research, creating multimedia information products, analysing data, designing solutions to problems, controlling processes and devices, and supporting computation while working independently and in collaboration with others' (ACARA 2012c).

The infusion of technology in the process of learning and teaching is believed to have more than just motivating effects on students' engagement to learn. It can also promote students' independence in learning, increase the connection of learning to life, provide what the teacher cannot provide, improve the quality of presentations in class, increase the amount of resources for learning, and enhance students' interaction with their peers and the teacher (Goodison 2002). In view of these potential benefits, the Australian government has invested substantially in the supply of technological equipment to schools, in support of the expected widespread utilisation of ICT by teachers and students. One of the recent programmes is the Digital Education Revolution (DER) in which Australian $2 billion were budgeted by the former Rudd Government to provide every ninth through twelfth grader with a computer (Harris 2011; Murphy 2011). For the schools, as planned in the state of New South Wales (NSW; NSW DEC 2011), for example, 4300 interactive whiteboards, at the cost of Australian $23 million, have been installed in 1000 NSW primary schools since 2012.

15.3   ICT in Language Learning

As one of the key learning areas in the school curriculum, the language curriculum is designed to embrace ICT capability development as one of its components:

> Students use ICT when they interpret and create print, visual and multimodal texts. They use communication technologies when they conduct research online, and collaborate and

communicate with others electronically. In particular, they employ ICT to access, analyse, modify and create multimodal texts, including through digital publishing. (ACARA 2013, "Information and communication technology (ICT) capability", para. 2)

While ICT application is expected to bring about a range of benefits to the language learners, the English learning process involving ICT applications is also expected to promote ICT capability:

As students interpret and create digital texts, they develop their capability in ICT including word processing, navigating and following research trails and selecting and evaluating information found online. (ACARA 2013, "Information and communication technology (ICT) capability", para. 2–3)

From the policymakers' point of view, it is also expected that language-teaching efficiency will benefit from the use of technology, just as would the teaching of other subjects in the school:

Learning languages is enhanced through the use of target language multimodal resources, digital environments, and technologies that provide for both synchronous and asynchronous learning experiences. Accessing live target language environments and texts via digital media contributes to the development of information technology capabilities as well as linguistic and cultural knowledge. Accessing diverse real–time contexts extends the boundaries of the classroom. (ACARA 2012a, p. 14)

15.4   Benefit or Not

To date, the actual impact of technology on language learning has remained controversial. In spite of the government's commitment to promoting technology in schools, there seems to be no classroom-based evidence showing that increased utilisation of technology would improve language learning. There is no evidence that clearly shows that there were increased applications of ICT as a tool in language teaching due to the provision of large numbers of computers and interactive whiteboards to teachers and students (Goodwyn and Findlay 2003; Harris 2011). In general, in school settings, traditional modes of teaching and learning seem to be preferred by at least some teachers and students (Goodwyn and Findlay 2003; Harris 2011). Compared to other subjects such as mathematics and science, technological revolution in language subjects seems to have happened to a much smaller scale (Goodison 2002). Traditionally, language subjects are considered to be the least compatible with technology use probably due to the nature of the subject, often described as 'humanities-based, liberal and book-dominated culture' (Andrews 2000, p. 23). Even though there is an increasing use of online modes of delivery for language programs, some teachers and students still prefer face-to-face interactions to online delivery (Pena and Yeung 2010). Also, even though some teachers use the technology provided to them, they rarely do so effectively.

For some teachers, the use of technology in teaching is not even voluntary. Some of them do use technology just because they are required to do so to fulfil their obligations and to meet certain requirements (Yeung et al. 2012b). The potential of

technology application in boosting students' outcome has therefore not been sufficiently exploited by language teachers. From this perspective, we may speculate that it is the people, instead of the physical facilities, or resources, that allow the benefits of technology to actually materialize in language learning and teaching. This is substantiated by a range of studies which suggested that among other factors, pedagogical and psychological factors tend to have the most significant influences on the utilisation of technology in learning and teaching (Becker 2000; Hennessy et al. 2005; Rogers 2002; Veen 1993). These factors are elaborated below. While reviewing these factors, we will be able to explicate how technology can be used to its full potential for language-learning purposes and how barriers can be overcome to allow the effective use of technology to benefit language learning.

15.5 Issues with Learning Objectives

The literature has suggested a number of benefits of technology for learning. Attracting and retaining learners' attention to learn has been frequently mentioned as one of the major advantages of technology (Cogill 2003; Cooper 2003; Davison and Pratt 2003; Goodison 2002). However, the sensational nature of computer graphics has raised concern over students' overemphasis on the presentation of the layout features of the technology rather than focusing their attention on the intended learning objectives (Cogill 2003; Goodison 2002; Hennessy et al. 2005). When ICT becomes a compulsory requirement in all learning areas, language teachers, like teachers from other subjects, are likely to face the tension between the use of ICT to achieve learning goals and the demonstration of technology use per se. For students, a shift from language-learning objectives to attention given to superficial software features will become a distraction from curriculum goals. Furthermore, for some teachers, when language lessons are deliberately adapted to fit in with the development of ICT skills, the actual amount of time spent on language-learning activities may be decreased.

Potential Solution The inconsistency between technology use and learning objectives could have important implications. Firstly, despite the emphasis on technology use, it is important for teachers to ensure that the focus on language-learning objectives is maintained. For the application of technology to add value to the language classroom, we need to ensure that it is clearly oriented towards the goals of the language lesson. It could be a disaster if teachers apply software features in a superficial way and overemphasize presentation layout, as these will result in the language lesson becoming a demonstration of technological features instead (Goodwyn and Findlay 2003; Hennessy et al. 2005). Technology should be used only when it is appropriate and clearly advantageous over other resources. Primarily, teachers need to first ask themselves how the technology is going to be used and what it is for, to determine whether it is appropriate. As language learning is not one of the 'technologies' domain in the National Curriculum (ACARA 2012b), ICT should be treated as a 'tool' for effective language learning as suggested in Partnership for 21st Century Skills (2007).

Secondly, even though it is argued that technology can be used to support a variety of language activities, ranging from 'the most mechanical drill-and-kill exercises to fully communicative real-time conversations' (Blake 2013, p. 15), optimal use of technology requires a clear mapping of a relevant tool to each learning activity. In essence, it is not about how much is used, but how they are used (Mishra and Koehler 2006; Sipilä 2010). According to Hennessy et al. (2005), to best address learning objectives, what is required is the critical and selective use of the appropriate technology, which may involve two aspects as follows: (1) the choice of technology for the best effect and (2) the interface between non-technological teaching approach and technology use.

The first aspect is to use various tools for different activities or different pedagogies according to their relative advantages. It is problematic to ignore the diversity of technological tools with different features and consider technology as a homogeneous tool yielding similar effects. Different tools empower teachers in different ways. For example, the Internet increases teachers' access to authentic target language-teaching material. Online chatting helps teachers to encourage language learners to engage in interactions, to facilitate the negotiation of meaning and language production, and to create global learning networks (Blake 2013). Facebook has been highlighted by Blattner and Fiori (2009, p. 25) as an innovative tool for 'authentic language interaction and development of socio-pragmatic awareness (language use in specific contexts, relationship building, and language awareness through observation and/or experience)'. The authenticity offered by Facebook-based communication with speakers all over the world is deemed especially beneficial for intermediate and advanced learners to understand language variation (Blattner and Fiori 2009). Web pages are not only resources for enriching language but also provide material for applying the target language as the medium to learn content or acquire information from a content-based approach (Blake 2013; Richard 2005). Tele-collaboration, which is an online communication tool that helps bring together language learners from different countries (O'Dowd and Ritter 2006, p. 623), seems to be a useful tool for intercultural language instruction (Belz and Kinginger 2002; Blake 2013).

A variety of other ICT applications, such as chat boxes, bulletin boards, messaging, blogs, wikis, and email, are also known to be facilitative to communicative language learning. This is partly because they reduce physical and time constraints for learners to be involved in meaningful and authentic communication with their teachers and other learners (Abraham and Williams 2009; Hampel 2006). Recent improvements in interactive classroom technology (combining the use of interactive whiteboard, video conferencing facilities, computers with Internet connection, lesson creation software, data collaboration software, etc.) have even made it possible for teachers to deliver language lessons to a number of schools at the same time (NSW DEC 2010). With the help of interactive classroom facilities, students in different schools can engage with each other in various ways as well. The list of the technological tools for each teaching approach is inexhaustive, as the number of new technological tools will keep increasing, and the innovative functions and features of each tool will keep evolving. The relevance and appropriateness of each

technological tool to the taught content are subject to teachers' discretion and judgement. Hence, teachers' creative use of the various technologies is highly valued and should be encouraged, but to make this happen, teachers should undergo proper training on the use of these tools.

The second aspect is about compatibility between non-technological teaching approaches and technology use. Some authors have proposed that the value of some important language skills such as spelling and handwriting should not be undermined despite the significant place of ICT in the curriculum (e.g. Goodwyn and Findlay 2003; Hennessy et al. 2005). Some researchers suggest conducting manual processes first and then using technology to enhance and extend these essential processes. In this way, the use of technology will add value to learning without compromising language-learning objectives (Hennessy et al. 2005). An example is to have students practise the language via traditional classroom activities first, and then the teacher can make use of blogs, videoconferencing, podcasts, and forums to expand communicative opportunities for students to apply their newly learned language skills when connecting to the world outside the language classroom.

15.6   Issues with Language Assessment

Nowadays, a wide range of technological tools such as recording equipment, statistical programs, databases, and programs capable of language recognition is used in language tests (Chapelle 2008). Three major contributions of technology to language assessment have been identified by Chapelle (2008). The first contribution is that computer-adaptive testing tools are nowadays capable of evaluating examinees' answers immediately and generating subsequent items accordingly. The second contribution is the use of multimedia in listening tests to contextualize aural language with images to monitor progress and guide improvement. The third contribution is that natural language-processing technologies have made it possible for learners' linguistic responses produced in speaking and writing tests to be scored by the computer. However, despite these major advances, some difficulties have also been observed. Apart from the substantial financial investment required to install new equipment for assessment, there is concern that the use of technology in language assessment may complicate what we intend to test. For instance, in computer-based writing tests, it is not only writing skills but also typing skills that contribute to the assessment scores. According to Chapelle (2008), what a computer-assisted reading test measures is not reading strategies in a traditional sense, but 'the ability to read with strategic use of online help' (p. 130). Furthermore, natural language-processing technologies assess learners' spoken and written language with particular focus on the linguistic aspect of answers (Chapelle 2008). This is in stark contrast to the intended outcome based on the communicative approach of language learning which emphasizes fluency over accuracy and claims that linguistic competence is one element, not the whole, of communicative competence. Moreover, in computer-based speaking tests, the interpersonal aspect—an essential feature of communica-

tion in authentic context—is missing. For these reasons, technology-based language assessment is sometimes considered as incompatible with communicative competence development.

Owing to these difficulties, technology-supported language assessment is unlikely to totally replace traditional forms of language assessment. Consequently, it is of no surprise then that some teachers feel strongly about the tension between the requirements of using technology in the language classroom and the adherence to traditional forms of assessment which, in contrast, give significant value to printed materials instead (Goodwyn and Findlay 2003). As many teachers use pedagogy conforming to the examinations for their subject content, too much emphasis on integrating technology as a component of the language curriculum will remain problematic as long as the use of technology in language assessment is not a general practice. An obvious example is that if word processing software is used in a writing test, the spelling check function can automatically amend incorrect spellings, making it impossible to detect students' spelling competence.

Potential Solution A possible solution to this is the use of a combination of technology-supported assessment and traditional assessment. These two types of assessments may be applied to different aspects of language tests based on their focuses and advantages. For summative assessment purposes, it will be useful to capitalize on the advanced functions of computer technology to assess the accurate use of language forms, but it is also important to assess communicative aspects of language using human assessors. For diagnostic and formative assessment purposes, computer-adaptive testing would have a significant role as it is fast and accurate, and perhaps more cost-effective. For example, in listening and reading tests, upon a successful response, the computer can generate the next test item appropriately aligned to the student's level of proficiency. By programming the test items in an appropriate sequence of difficulty, it is possible to very accurately identify each student's level of proficiency in the specific skill domains. In essence, the use of technology for assessment purposes should be approached with caution. For example, natural language-processing technologies may be useful for writing tests assessing the linguistic aspect of the learners' written language. Nevertheless, the scores for this linguistic aspect should only be treated as part of the final score because the other important aspects of the written language such as consistency, coherence, fluency, logic, and the content of the written piece can only be justly scored by an examiner. Most speaking skills are likely to be more accurately scored by a human examiner, who can provide more appropriate judgements on the communicative effectiveness of the examinee.

15.6.1   Issues with Pedagogy

Despite the increasing drive towards technology in learning and teaching, there are weaknesses in the language teachers' current pedagogical practices, which may become barriers against optimizing the benefits of technology for language learning.

While the choice of technology must be compatible with the pedagogy employed, pedagogy itself may need to be adjusted to accommodate the chosen technology. Some features of technology are attractive and may trigger students' attention, but conversely, they may distract them from valuable learning goals. This challenges teachers' pedagogical skills in minimizing the distraction, while maximizing the achievement of learning goals when using technology. In essence, the use of technology and pedagogy should complement each other (Blake 2013; Harris 2011). An additional complication in technology-supported learning and teaching is the increasing demand for achieving two interacting goals. That is, while learning the target language, students are also expected to build capabilities in using technology to complete various tasks in the language classroom. This adds an extra burden to the language teacher because, while it is not easy to achieve both language- and technology-related goals simultaneously, there may also be trade-offs whereby gains in one area may lead to negative consequences in the other.

For instance, whereas increased accessibility to information and resources via the Internet leads to a widened knowledge base, it also increases possibilities of plagiarism which can be a difficult issue to tackle. Even though teachers can use specifically designed software to detect plagiarism, it is not easy to monitor the way information is obtained, manipulated, and presented. Information from publicly accessible sources may be inaccurate, untrue, or misleading, and false information about language features could sometimes cause harm by reinforcing incorrect language habits. Hence, when setting tasks to students involving information from various sources, teachers need to specify not only elements such as the audience, the purpose, and word limit on downloaded text, but most importantly, emphasize the requirement for critical processing of the obtained information (Hennessy et al. 2005). It is essentially critical thinking and critical selection of relevant information from a wide range of sources that make information become useful knowledge. This emphasis on the learners' monitoring of available language material and selection of useful information clearly requires a shift from traditionally teacher-centred approaches to more learner-centred ones. It is therefore not surprising that with the increased use of technology, more student-centred activities and more collaborative learning are observed nowadays (Blake 2013; Goodison 2002; Sipilä 2010).

The increasing use of technology may also result in a new type of teacher–student relationship. Instead of the traditional relationship of teachers conveying knowledge to their students, teachers today may view ICT-savvy students as a valuable resource and may actually learn the latest technologies and applications from them. In this sense, the school setting is gradually becoming a broader learning community (Goodison 2002). Together with a shift to more student-centred learning, the increasing openness of information sources and the decreasing structure of teacher-directed instruction inevitably demand more flexibility in teachers' pedagogy. In practice, the use of technology has led to new directions in learning, which may include student-initiated activities and peer collaborations. Overall, these suggest a new pedagogical evolution in language learning. In general, Hennessy et al. (2005, p. 173–174) have provided a list of characteristics of effective pedagogy for ICT-supported teaching including:

- Affecting working processes and improving production
- Supporting processes of checking, trialling, and refinement
- Enhancing the variety and appeal of classroom activities
- Fostering pupil independence and peer support
- Overcoming pupil difficulties and building assurance
- Broadening referencing and increasing currency of activity
- Focusing on overarching issues and accentuating important features

The expected pedagogical evolution within the context of technology use is also reflected in Mishra and Koehler's (2006) extension of Shulman's concept of *pedagogical content knowledge* (PCK) to *technological pedagogical content knowledge* (TPCK). Shulman (1986) argued that having knowledge of the subject matter (content) and knowledge of general pedagogies (pedagogy) are insufficient for effective teaching. Teachers nowadays need to develop PCK which represents the intersection of content and pedagogy and deals with 'the ways of representing and formulating the subject that make it comprehensible to others' (Shulman 1986, p. 9). Basically, this distinctive body of knowledge enables teachers to transform content for teaching in effective ways. In response to the increasing use of technology in teaching, Mishra and Koehler (2006) have proposed the notion of TPCK which embraces technology as an important aspect of teacher knowledge in terms of how the subject matter is made accessible to learners. The extension of PCK to TPCK implies changes in the knowledge framework of teachers. In the sense of TPCK, neither knowledge of technology alone nor previous PCK, can maximize students' learning outcome in technology-supported language teaching. TPCK represents the intersection of technology, content, and pedagogy, which should no longer be considered as isolated from each other (Mishra and Koehler 2006).

Potential Solution Teacher education must be adapted to match the pedagogical evolution. Teachers' decisions and actions are also to some extent influenced by usual practice and the culture within their subject-specific community (Goodwyn and Findlay 2003; Kirschner et al. 2008). There are communities of practice 'where a process of social learning occurs between people with a common interest in a subject…' (Kirschner et al. 2008, p. 442). Hence, to language teachers, for the benefit of technology to materialize in language learning, it is important for the use of technology to be internalized as a subject-specific norm shared by language teachers. This internalization does not arise automatically from the increase of technology infrastructure in schools or compulsory requirements from authorities. The internalization will occur only when the relevance and benefits of technology application to the specific subject is visible to the subject-specific community. This may be realized through subject-specific professional development in which teachers are exposed to substantial examples of pedagogically meaningful technological application in language teaching (Goodwyn and Findlay 2003; Harris 2011). For any benefit to be sustainable, it is also necessary to promote professional dialogue about pedagogical use of technology within the community of practice so that language teachers can learn from each other. This is crucial because there is evidence that teachers' decision-making processes are shaped more by their actual experiences

and practical knowledge than theoretical knowledge acquired in teacher education programs (Kirschner et al. 2008; Sipilä 2010). It is therefore not surprising that more experienced teachers resist adopting technology in their classroom because they are used to non-technological approaches and have continually experienced success in achieving notable student outcomes without any technology (Hennessy et al. 2005). Therefore, effective teacher education should provide enough opportunities for teachers to play with various technological tools in subject-specific situations as well as to reflect on their congruence with practices in the subject delivery. In this way, teachers can accumulate hands-on experiences and practical knowledge in the pedagogical use of technology and build up a sense of ownership, which contributes to their further application in the classroom.

Even for those teachers who are competent personal users of technology, subject-specific professional development is also valuable. The extensive use of technology in personal lives does not necessarily indicate teachers' proficiency in the use of technology to teach a language effectively (Harris 2011; Hennessy et al. 2005). Pedagogical use of technology demands not only a general understanding about technology but also, more essentially, knowledge about how different technologies can deliver various language outcomes. Teachers need to be explicitly trained to adapt technology for language-teaching purposes and rectify any incompatibility between technology and the language content through effective pedagogy. Here, TPCK (Mishra and Koehler 2006) may be a useful framework to guide subject-specific professional development. According to this framework, it is the interplay of technology, content, and pedagogy that should be the pursuit of teacher training. In a language-teaching context, issues to consider may include: how technology (e.g. tele-collaboration, Facebook) can be used to enhance the effectiveness of pedagogy (e.g. intercultural language teaching, communicative language teaching) in delivering the content (e.g. intercultural communicative competence, communicative competence). Professional development programmes may start with considerations of how technology can be used to carry out popular learning activities more quickly, reliably, broadly, productively, interactively, and efficiently (Hennessy et al. 2005). Teachers will then also consider how these activities can be adapted further to facilitate more effective use of the technology to bring the best effects.

15.6.2   Issues with Teachers' Self-Concept

An important factor that has often been neglected is the self. With rapid updating of technological tools available to us, it is widely agreed that continuing self-initiated learning is essential for effective pedagogical use of technology (Blake 2013; Goodison 2002). Nevertheless, we cannot assume that teachers automatically have such commitment to self-initiated learning. According to Goodison (2002), there is a difference between commitment and compliance. Teachers who are committed to using technology for teaching not only attend training and implement programmes required by authorities but also become actively engaged in pedagogical use of

technology. Teachers' self-concept seems to be essential for such engagement. A lack of self-confidence or sense of competence is often found to be one of the major barriers leading to teachers' reluctance to use technology in their teaching (Cooper 2003; O'Mahony 2003; Sipilä 2010; Yeung et al. 2012a). Teachers' self-concept may be influenced by several factors. First, research has revealed that substantial personal use of technology in daily life has a positive relationship with teachers' attitudes towards the use of technology in education (Sipilä 2010; Wozney et al. 2006). It is possible that the personal use of technology, although not specifically for teaching purposes, improves teachers' self-confidence and self-efficacy related to technology, which contribute to their positive attitudes towards utilizing technology in their classrooms. Second, self-concept is developed from what teachers believe to be effective, based on their own teaching experiences. For those teachers who have developed a significant level of self-confidence through successful delivery of high-quality teaching using technology, the successful experience further reinforces the teachers' sense of competence. This is known as reciprocal effects such that self-concept and performance mutually reinforce each other (Craven and Yeung 2008). Shifting from non-technological approaches to substantial technology use poses a serious threat to teachers' self-efficacy, especially when they have negative experiences such as technology breakdown during teaching in class. Hence, non-technology users tend to choose conservative methods and stick to non-technological approaches, to be on the safe side. Third, gender stereotype may be another factor. There was some evidence showing that female teachers tend to have less positive self-concept in technology use for teaching purposes than male teachers (Colley 2003; Meelissen and Drent 2008; Shapka and Ferrari 2003). This gender inequality tends to imply that low self-concept in technology use maybe more common in language disciplines than in other curriculum areas such as science and mathematics since language teachers are mostly female. Nevertheless, there is also contrasting evidence showing that female teachers hold more favourable attitudes towards technology use (Anyan et al. 2000), whereas Sipilä (2010) found slightly more positive attitudes towards technology in male teachers than in female teachers, but the difference was not statistically significant. Hence, the lack of consistent evidence suggests that gender stereotype may be a myth.

Potential Solution Considering the factors outlined above, psychological factors should be addressed in professional training to enhance language teachers' self-concept in technology use. While negative experience can destroy teachers' self-concept in the use of technology for education, positive experiences with technology use can build up their self-concept in this respect. Therefore, providing positive experiences with pedagogical use of technology becomes an integral part of training programs. Subject-specific training mentioned earlier would also be helpful. By highlighting the relevance and pedagogical benefits of technology to language subject with rich examples, professional development and professional dialogue would foster language teachers' belief in the value of technology for teaching languages. By providing positive feedback and encouraging self-appreciation upon success, teachers' self-concept in TPCK would be reinforced. Once technology application

becomes the norm of language teachers' practice, teachers' positive self-concept would continue to drive further application. By offering opportunities for teachers to play with and explore the functions of technology, more positive experiences can be generated when teachers become increasingly sophisticated in using various technological tools. They may also develop the flexibility to deal with different situations and find innovative ways to increase effectiveness and cost-effectiveness. In sum, language teachers' positive attitudes towards technology and their self-concept in successful pedagogical use are crucial to their continual application of technology in language teaching. The first step to enhance their self-concept is probably to encourage and facilitate their personal use of technology in daily life.

15.7 Conclusion and Recommendation

To prepare young generations for the increasingly technology-sophisticated world, governments worldwide have invested substantially in the use of technology in schools. Whether such an investment represents value for money is controversial. Some research has found that despite increasing availability of technology in schools and despite compulsory requirements from authorities, technology has not been utilized to its full potential in language classrooms. To maximize the benefits of technology for language teaching, teachers' effective use of technology for teaching purposes is essential. Among other factors, learning objectives, language assessment, pedagogy, and teachers' self-concept seem to be the most salient factors which influence teachers' actual use of technology. After reviewing these factors, the following suggestions are made to promote effective applications of technology in language learning and teaching:

1. Technology use should be clearly oriented towards language-learning objectives
2. Technology should be used critically and selectively. This involves:
    − Using different technological tools for different activities and pedagogies
    − Using a mix of both technological and non-technological approaches to complement each other
3. Technology use should be given a place in language assessment while some traditional language assessment approaches should be maintained as well
4. Subject-specific professional training in technology application is needed to:
    − Promote technology application as a norm in the language discipline
    − Make the relevance and benefits of technology application visible to the language subject community
    − Facilitate technology-related professional dialogue within the language subject community
    − Provide opportunities for language teachers to try out technologies in subject-specific situations
    − Develop skills in pedagogical use of technology and TPCK
    − Build up language teachers' self-concept in pedagogical use of technology

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