

Teaching (with) technology: The scope and practice of teacher education for technology¹

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ABSTRACT

This paper discusses the scope of language teacher education for technology and looks at different ways of providing professional development in this area. Technology education for teachers faces a number of challenges, both in selecting the right content for the right audience, as well as in its implementation. In this paper I look at some of the ways in which these challenges have been met in different contexts. The paper concludes with a simple model for the provision of technology education for teachers.

Introduction

Although sometimes it almost seems heretical to question the value of technology, there continue to be many examples of unsuccessful and often costly attempts at using computers in education (cf Hubbard 2003).² An important reason for this situation is the challenge for teachers of integrating technology meaningfully into the language classroom. Uniquely, the use of technology requires both pedagogical as well as extensive technical skills on the part of the teacher, and therefore a substantial investment of time and resources at the personal and the institutional level. Technology also has the potential to be disruptive to regular teaching practice by enabling or facilitating types of learning support that are not traditionally part of the teacher's role, such as support for out-of-class learning. In addition, learners need to be prepared for their use of technology to assist them in their learning, and this learner training is an additional responsibility for the teacher. Clearly, the success of using technology in education relies to a great extent on the teacher, and the teacher's ability in turn relies to a great extent on the amount and type of training and support available. In this paper I look at the content of technology education and at ways in which it can be provided in order to ensure the potential of technology in language education is realised.

What do teachers need to know about technology?

Considering how long computers have been a part of the field of language teaching, it is surprising there are no clear guidelines for technology education. It is often unclear what needs to be included, to what level, and how it will be assessed. Part of the reason is that technology education is broader than many other areas of teacher education as it includes not only a pedagogical component, but also a technical and a learner-training aspect.

One of the first questions faced by administrators and teacher educators is whether technology education should include technical training or whether the teaching of computer literacy should be left to information technology professionals. In the case of in-service education and in many smaller schools the latter may not be an option, as often there is no dedicated staff to provide courses. There is also an argument to be made against separating the technology from its use (just as arguments have been raised against the teaching of grammar in isolation).

Even if computer literacy is included in teacher education, it is unclear exactly what should be taught and to what level. Godwin-Jones (2002) suggests that technology education should at least include basic electronic skills (the use of the computer operating software, the Internet and word-processing software), digitisation (eg being able to transfer images to the computer to use in class), presentation and website skills (being able to create presentations and simple class websites), and content management and course websites (using tools for online class communication, assessment and marking, for example). These would probably be uncontroversial, although many teachers may not be comfortable with all of them.

But how about more advanced skills such as the use of authoring tools for creating language materials? Although there exist easy-to-use authoring tools (eg Hot Potatoes) that can be easily and successfully used

by teachers, the production of more sophisticated materials requires a very considerable investment, which some authors have argued against, suggesting that becoming too involved with the technical aspects of Computer Assisted Language Learning (CALL) development may distract from the methodology. There is a distinction between teachers being able, first, to *use* a certain technology, second, being able to *create* materials and activities using that technology, and, third, being able to *teach* with that technology. The thinking behind this distinction is that knowing how a program works does not equate to knowing how to use it in a teaching situation. This is where the technical focus shifts to a pedagogic one.

Knowing how to teach with a technology first and foremost requires knowledge of how that technology can support a particular pedagogic goal. One way of doing this is first to identify specific learning principles and then use technology to implement them. For example, Egbert, Chao and Hanson-Smith (1999) describe eight conditions for optimal language learning environments derived from second language acquisition that technology could facilitate. These could be used as a starting point for teacher education. A similar method has been used by Chapelle (2001, 2003) and others to support interactionist approaches in language teaching. By showing how technology can facilitate interaction and how this relates to the development of a second language, a clear case can be made for the use of technology and teachers can recognise its potential benefit. What these approaches have in common is that they start from what is known about the learning process and then identify the most appropriate technology, not the other way around. Egbert, Paulus and Nakamichi (2002) found that such linkages and the degree to which technology education is contextualised and integrated with the teachers' actual teaching practice are important factors in the success of technology education.

The above position does not mean that pedagogical innovation cannot be technology driven. For example, at present (early 2009) teacher educators may look at the proliferation of so-called Web 2.0 applications or 'social software' to try and tap their potential for communication, learner control and to support constructivist classroom practice. Such technologies may also lead to the development of new approaches to learning and teaching that were previously unavailable or difficult to implement. An example is the use of mobile technology (cf Kukulska-Hulme and Traxler 2005), which makes it possible, among other things, to offer location-based language content and support for language use. It is only now that we are slowly starting to see the development of teaching and learning environments that meaningfully incorporate the affordances of such technologies.

What such developments mean, however, is that teachers not only need to be able to recognise the potential of a technology and ensure it is used towards implementing a particular pedagogic goal, but also that they need to be able to support their students in learning with the new technology, sometimes in new ways. There is something of a myth being created about the 'connected learner' who, it is made to appear, is extremely savvy and always in tune with everything and everyone. This is a distortion of the truth because even though learners may indeed use technology frequently and feel comfortable with using it for all sorts of purposes, especially entertainment, this does not mean that they know how to make use of technology for *learning* purposes. Like the use of 'technologies' such as dictionaries and word lists, learners need to know how to make the best use of a tool to derive the greatest benefit from it. As Murray (2003: 38) put it:

While technology enthusiasts have advocated the use of technology to promote learner autonomy and have stated learner control as an advantage of computer-based technologies, teachers have often found in their classrooms that learners need pre-teaching of text skills they will need for web search and of computer skills they will need to navigate interfaces.

Many of the recent technological developments have great potential for supporting out-of-class language learning in particular. Social networks facilitate informal communication and group work, three-dimensional environments such as Second Life allow simulations and role plays, and mobile telephones offer access to learning materials and teacher support from anywhere. It is clear that these developments can facilitate learning opportunities outside the classroom. However, many teachers will know from experience – and several decades of autonomy research support this (cf Benson 2007) – that learners need considerable preparation and ongoing support to be able to successfully self-direct their learning. Jones (2001: 361) writes: 'It [the effectiveness of CALL] undoubtedly requires more learner training and

supervision than other self-access pursuits, and such training and supervision would have to be carried out by teachers.'

To sum up, then, teachers need different types of skills in relation to technology: (1) technical skills, either for using or for producing materials, or both; (2) pedagogical skills, to make meaningful use of the technology; and (3) learning support skills, to help learners make meaningful use of the technology.

But not all teachers need to develop the same technology skills and develop them equally extensively. Hubbard and Levy (2006) point out that different contexts may call for different types and levels of knowledge. They propose a framework based on an individual teacher's expected role, to determine the skills that need to be acquired. Adopting any one role depends on the teacher's institutional role (pre-service, in-service, CALL specialist, CALL professional) and functional role (practitioner, developer, researcher and trainer), as summarised in Table 1. Together, the overall nature of the teacher's role will determine the specific training needs for each individual.

Table 1: Institutional and functional roles of teachers (Hubbard and Levy 2006: 11, reproduced with permission from John Benjamins).

Institutional Roles	Functional Roles			
	Practitioner	Developer	Researcher	Trainer
Pre-service classroom teachers	X	X	X	X
In-service classroom teachers	X	X	X	X
CALL specialists (expert/adjunct)	X	X	X	X
CALL professionals (expert/adjunct)	X	X	X	X

Hubbard and Levy further distinguish between the development of CALL knowledge and skill, at both the technical and practical levels (Table 2). For example, knowledge at the technical level would involve understanding how computer systems operate, whereas practical skill would involve being able to use one's knowledge in teaching practice.

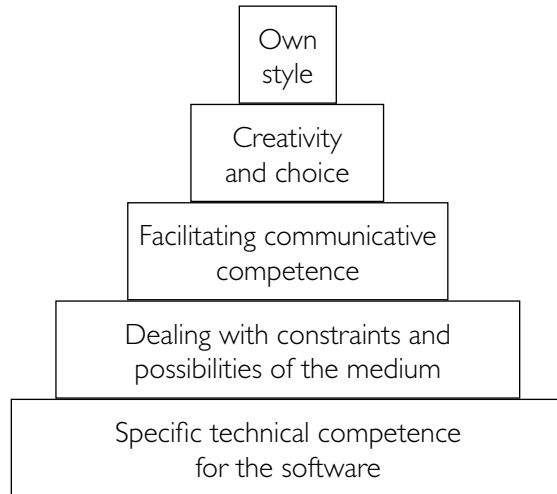
Table 2: Types of CALL knowledge and skill (Hubbard and Levy 2006: 16, reproduced with permission from John Benjamins)

	Technical	Pedagogical
CALL Knowledge	Systematic and incidental understanding of the computer system, including peripheral devices, in terms of hardware, software, and networking.	Systematic and incidental understanding of ways of effectively using the computer in language teaching.
CALL Skill	Ability to use technical knowledge and experience both for the operation of the computer system and relevant applications and in dealing with various problems.	Ability to use knowledge and experience to determine effective materials, content, and tasks, and to monitor and assess results appropriately.

Frameworks such as the above can help specify the training needs for a particular context. Hampel and Stickler (2005) present an alternative model that distinguishes between different *levels* of technology skills. They propose a pyramid model for online teaching, where the lower levels of knowledge provide the basis for the development of more advanced skills. Teachers need to have basic information and

communication technology knowledge and specific technical competence and be able to deal with the constraints and possibilities of the medium, in order to develop more sophisticated skills such as those needed to facilitate 'online socialization', to develop communicative competence, and to be able to be creative with the technology and eventually to develop a personal teaching style. The authors point out that 'online socialization' has only recently been recognised as a key skill for language teachers in the area of technology. This model thus combines both technical and pedagogical training and can be used by teacher educators to determine the current and required levels of individual teachers.

Figure 1: Skills for online teaching (Hampel and Stickler 2005: 317)



As for articulating (and measuring) the outcomes of such teacher education, efforts have been made by professional bodies such as the National Council for Accreditation of Teacher Education in general education and the American Council on the Teaching of Foreign Languages in the United States and the Council of Europe (see Murphy-Judy and Youngs 2006). Teacher educators can use the guidelines as a starting point to adapt to their own contexts. More recently, TESOL has published a 56-page Technology Standards Framework that specifies standards of technology knowledge for both learners and teachers (TESOL 2009), a major step forward for the field. Related to the development of standards for teachers is the need for the development of standards for teacher educators. This appears to be an area where more progress is needed; there is currently no professional body of technology teacher educators. However, the aforementioned Technology Standards Framework could be used by teacher educators as a practical starting point.

How can we teach technology?

After determining the existing teacher education needs, the question turns to the ways in which those needs can be met. Here are some different ways of approaching this question (each of them representing the ends of a continuum rather than a dichotomy):

separated	versus	integrated
formal	versus	informal
generic	versus	specific.

Teaching the use of technology separately from teachers' classroom teaching can have a number of advantages. Having a dedicated course ensures there is enough time, both for teachers and for the teacher educator. In the in-service context, a separate course may also give technology education a more formal position in the institution and enhance its status. The school could send a message that it is taking technology education seriously and that it has certain expectations of teachers to draw on what they learn in the course. For a teacher educator, such formal recognition may also mean having more resources available to develop appropriate course materials. It can make it easier for participants to concentrate on the topic at hand, without having to worry about immediately applying the new knowledge to a teaching

situation. Of course, there is also the practical advantage of teachers being able to take the course together and thus share their experiences and support each other.

However, in practice the luxury of having time dedicated to one area may not exist outside contexts such as Masters (MA) courses. Even if it did, for those teachers who have reservations about technology in language teaching (see the section on 'issues and directions' below), a whole course on the subject may not be appealing. There is also a pedagogic objection to separating the means (technology) from the end (teaching successfully). As mentioned above, the success of new technologies in the classroom depends in large part on the teacher's ability to apply them meaningfully, especially in the language classroom where the technology supports not only the delivery of content but also the building of skills. It is questionable to what extent the knowledge gained from a separate course translates into classroom practice. An integrated approach has the practical advantage of not requiring timetabling changes but it may also overload teachers busy with running their classes, especially those who are less experienced. In pre-service courses some successful models exist that combine a separate course with integration into the rest of the curriculum. For example, Hegelheimer (2006) describes a course as part of the MA in Teaching English as a Second Language at Iowa State University, where, in addition to a required course ('computer methods in applied linguistics'), the use of technology permeates the other courses to ensure that transfer takes place. This includes the required use of PowerPoint to present research to others in the course, the creation of a homepage with assignments and activities for language classes, electronic course and grade management for those classes, and the use of statistical software for the Language Testing course, all designed to encourage the immediate application of content covered earlier.

Another distinction to be made in relation to teacher education is between formal and informal learning. Many teachers learn to use technology informally, out of enthusiasm for the medium and with help from colleagues. Although this may work well for some, it is almost certain to leave out others and a formal approach is likely to lead to more consistent results across the board. However, informal networks certainly do have their place, as early adopters and innovators thrive on the ability to find out new applications for new technologies. Within a school, rather than formalising all training, it may be best to support such informal work through the provision of resources and by recognising individual staff for their contributions. Hanson-Smith (2006) describes the successful use of such informal networks and communities of practice to support language teachers.

A third distinction is between more generic or more specific technology education (similarly to Levy's 1997) distinction between holistic and expert views of CALL education). Generic approaches aim to provide teachers with basic skills that will enable them to apply any technology to a teaching situation. Unlike the specific approach, which would teach how to use a certain commercial program, the generic approach would, for example, show how to assess the suitability of that program and others like it and how to make decisions on whether or not to implement it in the classroom and how. A large part of the rationale for the generic model comes from making technology education future-proof, as it aims to provide skills that are independent of any particular technology.

Despite the potential benefit of such approaches, in practice there have been a number of reasons why they have not always worked. One of these is a lack of time, as developing a good generic knowledge is demanding and still requires teachers to apply that knowledge to the specific tools available in the school. Such training also runs the risk of being rather abstract if it is not immediately related to the teaching demands faced by teachers. The success of a more generic approach has also been found to be strongly dependent on the amount of ongoing support that is available to teachers. Unless there is considerable follow-up and incentive to apply a generic knowledge course to new situations, the realities of teaching often quickly make such knowledge obsolete. Teaching how to use a number of specific programs is often quicker but has the downside that with each new program or new version of a program, additional training may be required.

In practice, a wide variety of approaches to teacher education exists in this area. To determine which are the most common types of technology education, Kay (2006) conducted a meta-analysis of 68 studies of technology education in (general) pre-service teacher education in the United States. She found that the most frequently used ways to introduce technology included:

- integrating technology in all courses (44%)
- using multimedia such as through the implementation of online courses and electronic portfolios (37%)
- focusing on the education faculty with the hope that over time this would filter down to pre-service trainees (31%)
- delivering a single technology course (29%)
- modelling how to use technology (27%)
- collaboration among pre-service teachers, mentor teachers and faculty (25%)
- practising technology in the field (19%)
- offering mini-workshops (18%)
- improving access to software, hardware and/or support (14%)
- focusing on mentor teachers (13%).

One of the key findings from this study was the relatively strong support for integrated approaches, the use of mentor teachers, and the use of more informal networks such as those between teachers. Kay (2006: 389) sums up some of the benefits:

Placing preservice and in-service teachers in teams to collaboratively identify ways to integrate technology into the curriculum has a number of benefits, including providing opportunities to explore and practice technological applications in a supportive environment, developing positive relationships between local public schools and the university, and increasing the comfort level of using technology.

However, there are also potential disadvantages:

The key challenges of applying this approach are (a) the considerable organization and time needed to develop effective learning communities and (b) the requirement that all parties must be motivated [...]. If one part of the community is resistant to the use of technology, the effectiveness of the strategy is compromised (Kay 2006: 389).

Kay and others have suggested that a combination of approaches may be the most likely to be successful.

Another prerequisite for success frequently mentioned in the studies above is the importance of teaching technology through technology. By experiencing a course website as a learner, for example, teachers are more likely to understand how to use one to support their own teaching (see Hampel and Hauck 2004 for a report). A more recent example is the use of mobile technology for teacher education. Wishart (2009) reports on the use of PDAs (personal digital assistants) to provide trainee teachers with access to relevant materials and support from the teacher educator.

Regardless of what combination of the above strategies is decided on, certain factors have been found to play a key role in the ultimate success of any program:

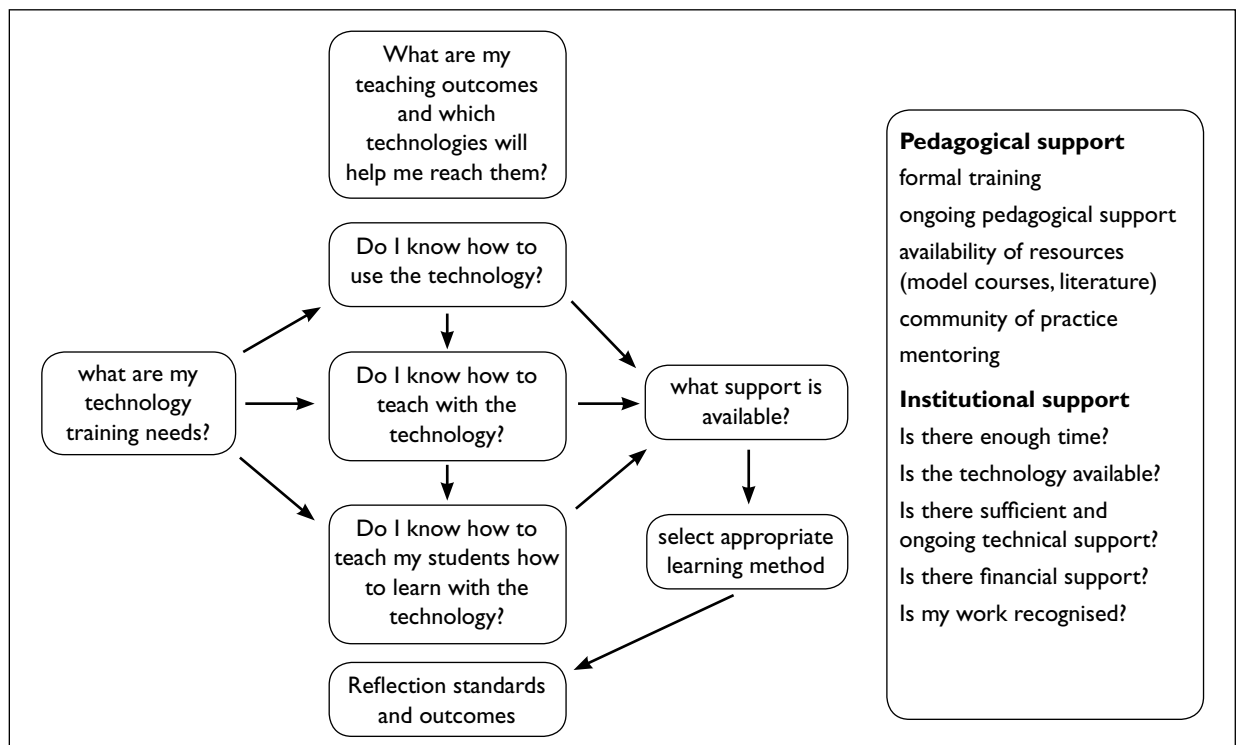
- 1 Good access to computers with ongoing technology support.
- 2 Time, both during and after the course, for participants to learn about and then implement what has been covered (Lam 2000), as well as subsequent recognition for their work.
- 3 The modelling and constructing of authentic tasks and relating of theory to practice through practical examples and applications (Kay 2006) to move beyond an understanding of technology to an understanding of how technology is implemented in a language teaching situation.

- 4 Experiencing technology from the learners' perspective (one of the conclusions derived from the online discussion by the IATEFL Learning Technologies SIG).
- 5 The availability of ongoing pedagogical support, for example through a mentoring program or a community of practice such as the Electronic Village and Real English projects.
- 6 Opportunities and encouragement to reflect on the implications of technology at a broader level (Levy 1997).

Putting it together: a model for technology in teacher education

Bringing all these findings together, the model in Figure 2 can be used as a starting point to determine a course of action for teacher education. It combines a needs analysis (with possible standards and outcomes in mind) and a selection of methods embedded in an appropriate pedagogical and technical/institutional support structure.

Figure 2: Implementing teachers' technology education



Issues and directions

Teacher education in this area has long met with resistance, some of it quite justified. Many teachers complain about 'technology for technology's sake' and may not see the benefits of yet another change (Reynard 2003; Fang and Warschauer 2004). Related to this issue, some teachers resent having to provide electronic literacy training. Egbert, Paulus and Nakamichi (2002) report a number of other concerns that teachers have. Most common are a lack of time (both to attend courses and to implement what is learned) and limited resources. Also commonly mentioned is a lack of ongoing support, both pedagogical and technical, which results in difficulties with integrating technology into everyday teaching. Other problems are related to curricular and administrative restrictions and the prevailing teaching philosophy, which may not match the more flexible types of learning and teaching that technology affords (see also Fang and Warschauer 2004).

The future direction for the use of technology in the classroom may well be more disruptive than it has been so far. Although less has changed about teaching in the past 20 years than some might have thought, this may not be true for the coming 20 years. At the risk of making false predictions, it is clear

that younger learners now have vastly improved access to information and, more importantly, have tools available to them (at no cost or a small cost) that increasingly place control over many aspects of their lives, including education, firmly into their own hands. In the near future 'ubiquitous', 'pervasive' and 'ambient' computing may realise the dream of location-independent learning, social software may offer an alternative or complementary support network for learners to that offered by teachers, and webbots may change how people communicate across languages in the first place. Regardless of whether this potential is realised or not, one thing that these and other current developments have in common is that they increasingly require students to be able to make decisions about their own learning (cf Reinders 2006) and to manage that learning by themselves. Perhaps this is the greatest change that we are likely to see from technology in the near future, and one that may have a strong impact on the classroom. The challenge for teachers will become one of helping learners develop the skills to deal successfully with the increased control and independence that technology demands. For teacher educators the key job is to help prepare teachers for this changing role.

Notes

- 1 A different version of this paper first appeared in *The Cambridge guide to language teacher education*, edited by A. Burns and J. Richards, and published by Cambridge University Press in 2009.
- 2 I use the word 'computers' here as the most common way in which technology has been used by classroom teachers. Although interesting developments are taking place in the use of mobile technology, and overhead projectors and radios could be subsumed under the heading 'technology', I mainly refer here to the use of computers and the Internet.
- 3 See <http://www.iateflcompsig.org.uk/onlineevent-apr06.htm>

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