EMERGING TECHNOLOGIES

THE EVOLVING ROLES OF LANGUAGE TEACHERS: TRAINED CODERS, LOCAL RESEARCHERS, GLOBAL CITIZENS

Robert Godwin-Jones, Virginia Commonwealth University

INTRODUCTION

Language teachers are working in a world which has changed in the past decades in fundamentally disruptive ways, through profound changes in the role that networked computers play in everyday life and through the social and demographic shifts brought on by an increasingly globalized society, bringing together more than ever before people from different cultures and languages in real and virtual environments. Not all parts of the world are affected in the same way or at the same rate of change, but these global trends are likely to bring significant changes to communities everywhere (Canagarajah, 2002). One of the byproducts of this new environment is the growth in opportunity for language learning, in particular through informal environments such as social networks and networked gaming. Increasingly, our students' lives involve heavy use of technology, especially through mobile devices, and the building and maintenance of meaningful relationships not necessarily based on face-to-face contact and sometimes extending well beyond their own home base. Second language teachers need to be able to work effectively in this evolving environment, preparing students for work and life in a world likely to be quite different from that in which they grew up, and which is likely to continue to change in significant ways. The challenges for training language teachers to deal with this dynamic are considerable. We need teachers not only to be proficient in the target language and have sufficient training in being effective classroom teachers, but they also will need to be able to cope with increased use of technology, and the need for all educated citizens to be global citizens (Kumaravadivelu, 2013). They will need to be able to follow new developments in technology and be able to understand their potential use in second language instruction. Crucially, teachers will need to be able to assess how new developments might fit in (or not) to their local instructional context. In this column we will examine the interconnected roles that L2 (second language) teachers may need to play in order to be effective in a changing social, educational, and technological environment. Fundamentally, this involves 1) gaining an inside appreciation of how computers and networks operate, 2) being able to evaluate new technologies and how they can be integrated into their own teaching and learning environments, and 3) learning how to equip students to deal with an increasingly interconnected and multilingual world.

LEARNING TO CODE

At a conference talk in November, 2014, Tim Berners-Lee, the inventor of the World Wide Web, called on politicians to learn how to program, not, he said, because we want them to spend their time writing computer code, but because we want them to be able to make informed decisions about laws having to do with technology use. There have been similar calls for other professionals, such as marketing specialists or business professionals to learn to code. In fact, there have been proposals for coding to be taught to all schoolchildren. This, indeed, will be the case in England starting in 2015, with all children from ages 5 to 16 being introduced to programming. Estonia already introduced computer programming in the early years of its primary schools. President Obama made a plea in 2013 for coding to be taught more widely in

U.S. schools and during the "Hour of Code" project in 2014 wrote some JavaScript himself. The recent uproar over *Barbie: I can be a computer engineer* captures the current interest in the U.S. in extending coding abilities to everyone. The book begins with Barbie describing to her sister a game she is designing. But when her sister asks to play the game, Barbie laughingly replies that she's only coming up with the idea for the game, her male friends are doing the programming. Subsequently, it turns out that Barbie has infected her own computer and that of her friends with a virus and has no idea what to do. Clearly, this is not a classic of world literature, nor an educational model for girls. A remix of the book has Barbie empowered to help design and code the game.

The idea behind the coding movement is not to teach hard-core programming universally, but rather to have children learn to code in order to become familiar with programming logic and procedures. Tools are being developed specifically for that purpose. One of those being widely used in education at the primary and secondary levels is Scratch, a free multimedia development environment created at MIT. It uses a visual, drag-and-drop interface with simple, English-like syntax (also available in some 40 other languages). Scratch can be used to create games, animations, or digital stories. There are a substantial number of language learning apps created by educators or children. Any app created with Scratch has viewable source code, making it quite easy to learn by example or to create templates. Using Scratch introduces children to the basics of procedural computer programming through a user-friendly, media-rich environment. Mitch Resnick, the MIT professor heading up Scratch development, gave a Ted talk, advocating for children to learn programming, in which he compared learning to code to becoming proficient in a second language. In his view, learning to code allows users to become "fluent in technology", by which he meant going beyond just using tools and services, to be able to "express oneself" through software. He goes on to tout the benefits of learning to program, many of which mesh with language learning skills. He pointed to a young programmer learning the role of variables by needing to use them in the process of coding the functionality he wanted, i.e. learning in a real-world, task-based context. Other skills mentioned are the ability to break down a complex idea into smaller elements, learning how to collaborate with others, and strategizing on how to work around bottlenecks, all of which will sound familiar to L2 teachers weaned on task-based language learning.

There's no question in my mind that the kind of "technology fluency" Resnick is promoting is something advantageous to any language teacher (and to teachers in other fields as well). Clearly, few children experiencing coding in school will grow up to become professional programmers, nor is there any expectation that language teachers en masse will be writing software. However, it certainly is the case that language teachers - to one degree or another - will be using software in their teaching and that the role and nature of that software will evolve considerably over the teachers' careers. This means that teachers should not just learn how to use current tools and services, but should have an understanding of how they were created, how they differ from what came before, how they might be improved, and how they fit together with other tools and services. One way to gain that kind of inside knowledge is to have some understanding of how technology tools and services are built (like learning a language to gain an inside view of a culture). Learning to code oneself is an important step in that direction. It can be invaluable in understanding what's possible and what's not possible, what might be trivial to code or might require a substantial investment in time and manpower. This provides a quite different perspective on software selection and use. I've experienced too many IT managers (information technology) and technology project directors who wasted considerable time, effort, and money buying into programs or projects for which, if they had had a better foundational knowledge of computing fundamentals, would not have been under consideration at all.

The necessity of teachers being able to evaluate and adapt new software is not a new idea in CALL research (Warschauer, 2002; Robb, 2006, for example), but in today's world what is needed is knowledge and experience that goes beyond being able to make informed decisions about new options in instructional technology. This needn't translate into learning C++ or Java. Using a visual programming

environment such as Scratch can provide a useful introduction to concepts and procedures, for learning programming basics such as abstraction, sequencing, loops, variables, functions and conditional logic. Additional experiential gains from learning programming basics include insight into iterative design, structuring data, the process and value of trial and error, and the nature of non-linear thinking. Learning the exact syntax of any given programming language is not as important as gaining an appreciation of basic programming logic and procedures. It could be sufficient to be able to understand a project concept expressed through "pseudo code", a high-level representation in plain English of a programming algorithm (a set of step-by-step operational instructions).

A tool that can provide an introduction to programming basics, and as well enable creation of quite sophisticated applications, is LiveCode, which like Scratch, uses an easy-to-follow, English syntax. In fact, anyone old enough to have done any work in HyperCard will feel quite at home with LiveCode, as it is based on the scripting language of that Apple product, HyperTalk. Like its predecessor, HyperCard, LiveCode has been used to create language learning courseware, with a set of templates available. There are multiple other opportunities for learning programming, from formal courses to online tutorials and instructional videos. The online service CodeAcademy provides free interactive introductions to a variety of languages, including HTML, JavaScript, PHP, Python, and Ruby; similar learning opportunities are available from Code Avengers and Code School. MOOCs (massive open online courses) provide more formal and in-depth programming courses. Online projects such as CoderDojo provide access to volunteer programming clubs, an opportunity to learn in a collaborative environment. One of the most accessible options for exploring coding informally is to try out one of the many online interactive programming sites, which, through directions and prompts, guide users to write sample code. The written code is then run, allowing instant viewing of the result, as in the screenshot from a JavaScript interactive tutorial in Figure 1.
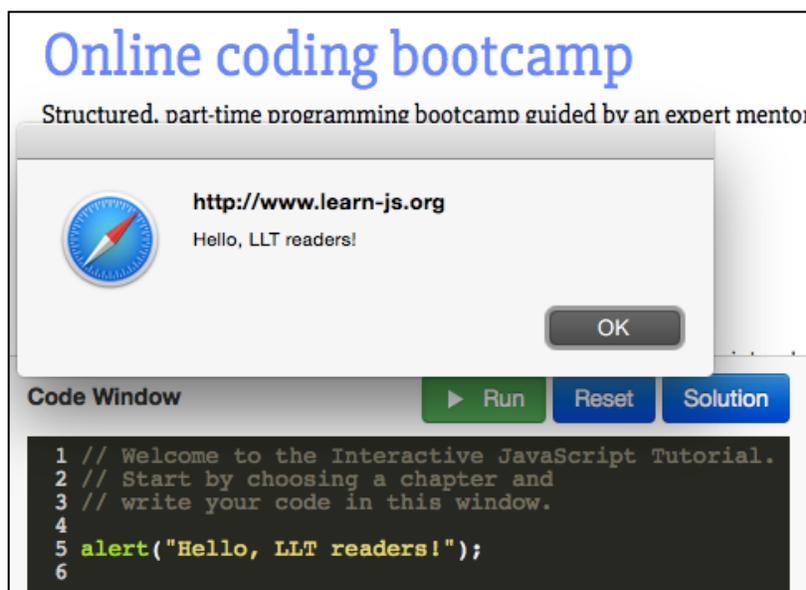

Figure 1. Beginning to learn JavaScript from an online tutorial

A quite popular language used for Web programming today is Ruby, an object-oriented language from Japan. The TryRuby site offers a nice 15-minute interactive tour of Ruby, while the CodeAcademy's short course takes 9 hours. The most popular language taught in North American computer science programs today is Python, created by a Dutch programmer. CodeAcademy's introduction to Python takes 13 hours and an interactive tutorial is available. Clearly, none of these sites will turn teachers into professional programmers, but they do provide a nice taste of what's involved in writing code.

TECHNOLOGY FUNDAMENTALS

Learning the fundamentals of computer programming is, of course, only one part of what teachers need to know in terms of technology. One of the areas of increasing importance is a fundamental understanding of the World Wide Web and the Internet. At a recent conference, I demoed a webpage I had created as a guide to resources for an intermediate language class, what used to be called a "homepage". The page was nothing fancy, basically a set of hyperlinks, some annotated, but it did, as do many webpages today, automatically reformat itself when viewed on a smaller screen. Afterwards, one of the other panelists, who had reported on her own Blackboard course site, asked me who had done the "programming" for the page I showed. The colleague was quite proficient in using a learning management system (LMS) to create a website for students, but had, I discovered in talking with her, no idea how webpages were created. She may have heard of HTML (hypertext markup language) or even of CSS (cascading style sheets), but did not know what role they played in webpage creation. By assuming webpages had to be "programmed", which likely implied having to use special, dedicated programming software, she was unaware of how simple webpage authoring is (or at least can be). Because the underlying code (HTML, CSS, or JavaScript) is plaintext, any text editor can be used, making it easy to copy and paste code from one page to another, or, as I had done, to paste the code necessary to switch CSS style sheets. This was code I had gotten from one of the many code sharing sites on the Internet (along with files containing sample CSS styles) and was able to use with only slight modifications. Users of an LMS, or any of the other many template authoring systems on the web today (for blogging, wikis, etc.) don't need this degree of web literacy in order to write a blog post or engage in other activities. However, I would argue, that, given its central role in communication and socialization today, knowing how the web works is important. Even in template-based systems, as well as in many forums or blog posts, it's possible to customize the look and feel by manually making changes to the HTML. A recent survey from the Pew Research Center found that most American internet users are not familiar with the basic concepts underpinning the Internet, including having difficulty in distinguishing the "web" from the "internet". That degree of digital illiteracy is untenable for language teachers.

In their article on "Language teachers in the 21st century", written a decade ago, Chapelle and Hegelheimer (2004) already call for teachers to have a "basic understanding of webpage design and creation" (p. 308), as well as how to upload an HTML file to a server and modify it as needed. In their inventory of web literacy (searching, selecting, repurposing, troubleshooting), I would add bookmarking, annotating, and curating, as well as an understanding of streaming media (and of the legal and technical issues in saving streams as files). Chapelle and Hegelheimer mention an awareness of how interactivity works on the web. Today that involves a fundamental understanding of the nature of JavaScript and of the differences between such a scripting language and actual programming languages (such as Java). The code in scripting languages such as HTML or JavaScript, is not compiled ahead of time into an executable application, as is the case with programming languages such as Java or C++, but rather run ("interpreted") in real-time when it's accessed, as in the case of HTML/JavaScript in a browser. In general, scripting languages tend to be quick and easy, while programming languages are used for more complex projects, but that distinction does not always hold. All you need typically to work with a scripting language is a text editor. Along those lines, an understanding of the role and nature of PHP, a server-side scripting language, is useful, particularly given its role as the language behind the popular LMS (learning management system), Moodle. The rise of HTML5 has made the role of helper applications and plug-ins less important than in the past (see Godwin-Jones, 2014a).

Chapelle and Hegelheimer in 2004 recommended familiarity with a set of communication tools. As an indicator of the extent to which technology can change in a decade, all the tools discussed (ICQ, IRC, Java Chat, AOL/MSN instant messaging, MOOs/MUDs) are today either gone or marginalized. One might put email for communicating with students in the list of communication modalities which have become problematic. Text messaging has become a much more widely used method of communicating, as

has Twitter. Most of these conversational exchanges are taking place on mobile devices. Given the central importance that mobile phones play in the lives of many of our students, an understanding of the possibilities for using them in our teaching is important. One simple approach in terms of mobile access is that previously mentioned, of creating webpages to function as a kind of mobile companion for a course. This can provide mobile-friendly access (large touch accessible buttons) to resources students might want to use on the go, such as vocabulary flashcards, audio files, or short readings. Students can save a link to the page as an icon on their phones' home screen, so that it's quick and easy to find. Putting the page on the open web, instead of within an LMS, also makes access easier, as there is no login requirement. Ideally, the page and its resources can be made available even if the user is off-line. This can be done through application cache or by saving the content in an e-book format (such as EPUB 3). Going this route to enable mobile access may be beyond the time and effort constraints of many language teachers, but keeping mobile in mind when thinking about making learning resources available students will surely be of growing importance.

In the mobile space, another area of importance is understanding the nature of mobile apps, an area of tremendous growth in recent years. Creating mobile apps is not likely to be the free time activity of choice for most language teachers. However, having a fundamental understanding of how apps work is easily achievable (see Godwin-Jones, 2011). It's important, for example, to be able to differentiate between proprietary apps, which run only on specific platforms, and web apps, which are universal. LiveCode, mentioned earlier, allows for creation of mobile apps for both Android and iOS operating systems. Hopscotch is a mobile app designed to teach basic programming skills to children and can be used to create games, animations, or stories. It uses a building-block system (chunks of pre-written code) that are combined and sequenced to create mobile programs (iOS only). For teachers interested in mobile gaming, the ARIS platform can be used to create quite sophisticated games for iOS devices (see Godwin-Jones, 2014b).

LEARNING TO USE TECHNOLOGY IN CONTEXT

Being knowledgeable about available technology tools and services for language learning does not necessarily translate into teachers being able to make effective use of CALL in their teaching. In fact, the consensus in recent research on the use of language learning technology indicates that even in well-equipped schools, there is scant evidence of effective technology integration in instruction (Hubbard & Levy, 2006; Ebsworth, Kim & Klein, 2010). This situation exists despite teacher standards and guidelines from a variety of governments, agencies, and organizations which strongly encourage or even mandate meaningful and effective technology use (Murphy-Judy & Young, 2007; DelliCarpini, 2012). Even among teachers who have had formal CALL instruction or undergone other professional training, the level of technology integration can be disappointing (Guichon & Hauck, 2011). We seem far from the state of "normalization" (Bax, 2003) in which the integration of technology is so widespread and routine that it represents the every day status quo in instructed language learning. There are, of course, a variety of possible explanations for this state of affairs, from practical issues of budgeting constraints, equipment/infrastructure issues, teacher overload, or lack of effective training to more intangible factors like teacher beliefs and attitudes.

One of the most fundamental impediments for teachers to integrate CALL resources effectively is a lack of knowledge of how the resources can be used in their particular context, with their students, with their curriculum, and within the limitations of the educational and cultural environment in which the school is located. Knowing the teaching and learning context in which learning resources will be used seems such an obvious requirement for effective use as not to need additional discussion. Yet, I would argue, there's not always enough consideration of how technology should be adapted to local conditions. In books on CALL, and, I suspect, in many CALL courses as well, there's some mention of localizing, but, for practical reasons little discussion of specific contexts. This makes it incumbent on teachers themselves to

take the responsibility of deciding the appropriateness of the tools and services to be used. In some cases, the physical conditions of use will set limits to what's possible to implement. In some parts of the world, reliable power and wired internet access may be unavailable, making mobile access the technology of choice. Knowing the capabilities of the most commonly used phones would in that case be necessary.

There are, of course, a good many other factors outside the control of the teacher which may have a significant impact on what is doable. There may be a national or local curriculum that precludes particular approaches to language instruction and that constrain the use of particular technologies. In some countries, preparation for success on high-stakes standardized tests may exert a determining influence on instruction (Chen & Reimer, 2009). I currently direct an ESL program (English as a second language) in which a large number of students from Saudi Arabia are enrolled. The Saudi Embassy precludes any of their scholarship students from participating in online or hybrid English language instruction. In many parts of the world, equipment scarcity or networking issues may make particular uses of instructional technology problematic. In other instances, particular cultures of use have developed around language teachers, influenced sometimes by national language policies, teacher reward systems, or by commercial interests. In Scandinavia, for example, English teachers can take advantage of the television culture which results in English language programs being televised with the original soundtrack, not dubbed into the local language, as is the case in most European countries.

I recently gave a presentation at ChinaCALL on creating OER materials (open educational resources) for teaching German. It was politely received, but I felt that I hadn't connected well with the audience, overwhelmingly Chinese teachers of English. Of course, this may have been due to an uninspiring presentation, but in talking afterwards with Chinese and non-Chinese colleagues some additional factors emerged. The obvious one was that my presentation was the only one that dealt with a language other than English, an indication of the absolute dominance of that language in Chinese L2 instruction. Another factor was the concept of creating shareable learning materials. The consensus among my conversation partners was that in the competitive environment of English language instruction in China, there are opportunities to leverage one's own work in developing materials or initiating innovative teaching techniques in order to receive recognition or even win teaching awards, which could translate into pay raises. Additionally, the publishing companies which market English textbooks have such a strong presence in the Chinese market that they may be discouraging teacher-created learning materials. The companies offer a host of auxiliary materials and services around their textbooks and are very active in organizing training seminars for English teachers, which obviously strengthens their market standing (Goh & Chen, 2014). This is a very different environment from India, where non-commercial language learning materials are being developed, with a particular interest in producing indigenous materials. There are number of national, government-supported OER projects underway. A recent project creates a hybrid learning environment for Indian English teachers using Moodle, which encourages collaboration in using and creating resources (C. Siskin, personal communication, November 20, 2014).

The effectiveness of technology use is also, of course, determined by the specific school context and the individual learners. The degree to which students feel comfortable and confident in the use of particular tools or services is an important consideration in their success or failure. Overcoming resistance to the use of "old school" technologies such as email or an LMS may be needed, or it might be necessary to convince students that social networking sites/tools they know and use can legitimately be used in education. In any case, learner training may be necessary (Hubbard, 2004; Hubbard, 2013). What might be needed as well is an understanding of students' relationship to the language being learned. This means getting to know something about students' identities and aspirations and, in some contexts, being able to provide students with the opportunity to develop identities through their L2 to supplement what the national or educational culture supplies (Lam, 2004; Johnson, 2006). Dealing explicitly as well with student attitudes toward technology use can be helpful in overcoming mismatches between student views and those of the teacher (Karabulut, Levelle, Li, & Suvurov, 2012).

As teachers become aware of new options in technology (through peers, conferences, media reports, workshops), they will need to be able to assess the potential applicability to their own teaching. Depending on the resource or software, that might be an easy decision—low cost, good match, easy to use/integrate—or considerably more involved—high cost, uncertain fit, required training. Teachers will need to make choices based on their training, on their accumulated experience, and on the time/energy they have available. This may seem a tall order for already overburdened teachers, but being able to adapt resources and approaches to local conditions is the only way CALL resources can be integrated into a learning environment so as to be meaningful and sustainable. A unified, packaged approach may be what school administrators and educational policy makers envision, when considering technology use in schools, but teachers with real-world experience know how unlikely that approach is to be successful. Moreover, the nature of technology resources for language learning has changed considerably, just in the past few years. It used to be that selection of software was a major decision affecting teachers, administrators, and technical support personnel. Additionally, software had to be installed on all computers, in a lab environment, or in classrooms. In this scenario the advice provided in many CALL manuals makes good sense, namely to be cognizant of software lifespan, institutional support, and compatibility (Levy & Stockwell, 2006). While clearly these concerns are still applicable to much software use (productivity suites, for example), teachers today are more likely to be using technology in a modular, nimble, and on-demand fashion, cobbling together online exercises, web resources, OER materials, and possibly mobile apps. This provides more flexibility and increases teacher control (and responsibility), thereby attenuating the sense that some teachers may have of losing control through technology use (Guichon & Hauck, 2011).

Giving teachers more responsibility for vetting resources for their own teaching may be unfamiliar in terms of technology use, but is really just an extension of what language teachers have always done, using their experience and creativity to adapt textbooks and other curricular materials to the needs of their students. What language teacher has not created handouts, exercises, and group projects to supplement textbooks? Encouraging teachers to record their experiences and systematize their findings allows others to profit from their work, leads teachers to reflect more on the significance of their actions, and in effect makes teachers into researchers. One recent study (McNeil, 2013) emphasized how important it is for teacher journals to be reflective, but also to have a real-world connection, in order for teachers to find enough value in the process to continue. Of particular appropriateness and usefulness for teachers is working on projects that reflect action research or exploratory practice, in which there are practical efforts to improve teaching through experimentation and to discover the roots of issues that arise in practice (Karabulut, Levelle, Li, & Suvurov, 2012). Research has shown that having teachers participate in research projects can enhance the value of the findings (Muller-Hartmann, 2000).

National patterns of use in terms of language learning materials provide one of the contexts in which CALL is used and in which teacher training and professional development occur. The essential role that consideration of cultural attitudes and practices play, as they relate to teaching and learning, is well-known through problematic experiences exporting Western-style teaching methodologies (Kern, 2006; Littlewood, 2007; Bannink, 2010) or learning management approaches (Reeder, Macfadyen, Roche & Chase, 2004). Teacher training programs that further national or regional goals and in which government or school officials have a vested interest stand a good chance of being sustainable. Successful programs are also likely to provide baseline training for all teachers, with options for interested teachers to go further. This is what is advocated for and built in to the TESOL Technology Standards. This is how the LearnIT2teach project in Ontario, Canada, is organized. It provides hybrid instruction for ESLand LINC teachers (Language instruction for newcomers to Canada). Teachers are trained to use a variety of learning resources created for the project, all of which are shared as OER, specifically designed for the bilingual Canadian context. Additionally, training is provided for teachers who want to create their own learning materials:

The LearnIT2teach professional development program does not directly teach computer skills; however, the four training stages are designed to support teachers, so long as they enter the program with minimal computer capabilities. An additional training stage has been developed specifically with the needs of program administrators in mind. Stage 1 is a face-to-face introduction to the key elements of the LearnIT2teach program; Stage 2 is an introduction to the various instructional and administrative tools available in the program's LMS, Moodle; Stage 3 lets instructors deepen their knowledge by selecting and customizing courseware and putting it to work in their own classes; and Stage 4 lets instructors create their own e-learning activities and upload them to a digital repository, for access by other professionals and by students (Fahy, Sturm, & McBride, 2012, p. 11)

Providing different levels of training and allowing teachers options for determining the extent to participate is more likely than a one-size-fits-all approach to accommodate the varied interests, backgrounds, and goals likely to be represented in a CALL course or other professional training. With the increasing number of part-time teachers, this kind of flexible scaffolding in CALL training is of growing importance.

One of the benefits of a program such as LearnIT2teach is that it brings local language teachers together, to enable them to learn from one another. Studies have shown that in developing skills and knowledge to use technology in teaching, it is often the case that informal learning is more effective than formal instruction (Kessler, 2007). Communities of practice (CoP) provide one means to supply that kind of informal learning. These can be local or regional in membership or have a larger scope if operating online. Webheads in Action, for example, has long been offering collaborative support for technology use in TESOL. Particularly useful for teacher-researchers is the ability to share and compare with peers concrete techniques, project ideas, and classroom integration strategies. Professional organizations and conferences can help supply that kind of experience as well. Another valuable experience is for teachers themselves to engage in a distributed learning environment (Dooly, 2009), whether that be a formal, credit-bearing, or an informal exchange based on a professional talk or as a follow-up to a conference. Informal networks are especially valuable if there are a range of voices and backgrounds represented. A study of an online community for Chinese teachers found that the "that heterogeneity of community members is crucial for the sustainable and healthy growth of an online professional development community in which participants can establish both vertical and horizontal relationships by sharing ideas, feelings and experiences with people with diverse voices but shared vision of professional pursuits" (Wu, Gao, & Zhang, 2014, p. 248).

A recent article (Hou, 2015) describes an online CoP for Chinese teachers of English, which emerged from a language teaching methodology course. A subsequent stage of the online community consisted of student teachers placed in schools. The study points to a number of benefits of the online community, with student teachers feeling more comfortable in the online setting to express their views openly and freely. The author also points to cultural aspects of the online community:

The framework of CoPs, a Western construct, shows a high degree of compatibility with Chinese styles of learning. The CoP mediated by online mode of communication has greatly impacted, and ultimately reshaped, a hierarchical social behavior pattern that Chinese student teachers and supervisors adopt, leading to a revolutionary change towards a more equal student-teacher relationship...The notion of passive, quiet, obedient, dependent, uncritical Chinese learners has been challenged in this study. The findings provide alternative evidence directly from the perceptions of Chinese student teachers and supervisors. (p. 14)

The project demonstrates the potential to adapt online practices, tools, or services to local conditions and, in the process, the potential to dispel lingering essentialist views of cultural identity.

INTEGRATING INTERCULTURAL COMMUNICATIVE COMPETENCE

Increasingly, a goal of L2 learning is to help students become informed and engaged global citizens, meaning that they understand their own culture and the beliefs, values, and assumptions that accompany it enough to be able to appreciate critically differences and similarities in interacting with others from different cultural backgrounds. One step in that direction would be for student teachers to engage in auto-ethnography, writing self-critically about one's teaching experiences from a cultural perspective (Kumaravadivelu, 2013). Adrian Holliday has suggested that teachers carry out a kind of ethnographic analysis of their classroom and its cultural components, arguing that this information is of more importance for success, than the teaching methodology used (1994). A project involving English teachers in Korea used digital storytelling to have teachers engage in reflective inquiry (Prosser, 2013). It's of course important for language teachers to have had first-hand experience with other cultures (and not just the target culture), either through face-to-face contact or virtually. Studies have shown how important it is for effective integration of intercultural communicative competence (ICC) into L2 teaching for the teacher to have had personal experiences of this kind (Göbel & Helmke, 2010). There is a much greater likelihood for ICC content and treatment to be shallow and stereotypical if the teacher has had limited exposure to other cultures. Göbel and Helmke's study shows that a criteria for selecting cultural content that many teachers use is the extent to which it is up-to-date rather than whether it incorporates topics that will lead to discussions uncovering meaningful differences in perceptions and perspectives between cultures. A study by Young and Sachdev (2011) revealed that one of the strategies teachers used in choosing cultural materials was to avoid conflict. This is an area which could be helped by teacher training, through guiding teachers towards ways to handle discussion of controversial topics, treating them as critical incidents and rich points for analyzing cultural difference (Belz, 2002; Thorne, 2003). L2 teachers coming into contact with peers in formal or informal ways can help in finding strategies for dealing sensitively and effectively with situations rife with learning potential, but also with risk.

In addition to CoPs, a more formal option for teachers is participation in MOOCs, which typically involve participants from a variety of countries and universities. MOOCs have expanded from their origins in North America to be offered by a large number of countries. At the same time, there has been some movement to address local conditions, in terms of language, culture, and technology access (Fyle, 2013; Godwin-Jones, 2014c). Of particular benefit are local groups that sponsor meet-ups, either through informal get-togethers or by way of formal courses at a local university, to discuss course content, provide a local perspective, and possibly to make available locally developed assessments, which can be the basis for academic credit. MOOCs have been developed specifically for language teacher training. The University of Oregon has offered several MOOCs for ESL teachers, in conjunction with the US State Department. The Open University (UK) will be offering a MOOC for English teachers in 2015.

Many MOOCs have a finite course structure, with learning and collaborative activities available only for the period during which the MOOC is being offered. The so-called cMOOCs (constructivist MOOCs) follow a different pattern and provide the opportunity for teachers (or others) to engage with each other beyond the confines of the course, thus providing opportunities for establishing longer-term communities of practice. One recent example is the Connected Learning MOOC. The course was built around the idea of learning about connected learning by using tools (blogs and Twitter) that are principally used today to collaborate and communicate online. The course also emphasized the advantages of the open web and the importance of student writing and other creative work being made available openly and freely on the Internet, not kept within a proprietary system. It encouraged participants to establish a personal learning space for documenting and sharing. Part of that effort is learning how to set up one's own website, including the basics of server management and of how to register one's own domain. As an outgrowth of another cMOOC, ds106, taught at Mary Washington College, that College has been encouraging students to establish a personal domain and has set up a service to allow them to do that. This is the kind of technology fluency we should be aiming for in the training of language teachers.

OUTLOOK

The idea of having one's own internet domain offers an opportunity for creating e-portfolios, both for students and teachers. One of the benefits of having one's own website is the accompanying implication that this is a longer-term, ongoing project. Having teacher education as a one-shot experience is in conflict with the reality of teacher development over time. This is all the more the case when technology is involved. Asserting one's professional identity through a personal domain is an indicator (and encourager) of teacher autonomy, as well as setting up a platform for the teacher as researcher, a place to document and share classroom experiences and experiments.

Running one's own server is also one of the activities associated with a recent movement in education, at least in North America, "maker" culture. The idea is that students create and share real products, whether they be digital stories, 3-D objects, or mobile games. It stresses hands-on experience and collaboration. This is in part an outgrowth of the mashup culture, users creating something uniquely personal from disparate elements. It is also clearly tied to the call for all children to learn to code. Maker culture is most commonly associated with STEM fields (science, technology, engineering, math), but there are examples of projects in the language arts as well as in second language instruction. Maker culture is, in a way, the logical extension of the idea of situated learning, an important concept in teacher education today. It provides a parallel to the call in communicative language instruction for students to use language for real-world exchanges. The Maker Lab in the Humanities at the University of Victoria features projects that use mixed media methods to interpret historical materials and to build interactive sites from humanities perspectives.

It seems unlikely that large numbers of L2 teachers will introduce maker projects into their classes, but learning about that approach to technology integration and its possible applications to teaching could provide useful information on the environment in which today's students are living and learning. What L2 teachers are able to do in terms of new technologies is affected by a great number of factors, in particular where a teacher is in terms of career trajectory. Teacher development is a gradual process, as teachers "progress from a narrow focus upon classroom procedures and survival strategies, in their early work, to a more developed sense of the social and cultural aspects of the classroom when they are more experienced" (Bax, 1997, p. 238). It's possible that the incorporation of technology could follow that pattern but it's more likely newly trained teachers will have a headstart in terms of technology familiarity. It's equally likely, however, that, with the growth of on-line instruction, all L2 teachers may be expected to teach hybrid or online courses, whether they have been trained to do so or not. That may include part-time teachers as well. This increases the need for more and better opportunities for teacher collaboration and continuous training, which should not only deal with the mechanics of how to use technology in teaching, but also on "helping teachers reconsider their professional identities as teachers in an online environment" (Comas-Quinn, 2011, p. 25). As has often been pointed out, coursework alone may lead to teacher training, but not necessarily to technology use, as what is needed for that to happen is a "sequence of situated technology experiences" (Egbert, Paulus & Nakamichi, 2002, p. 118). Increasingly, that is likely to occur online. Ideally, the online environment, whether a MOOC, CoP, or other community site, will offer opportunities for both formal, structured learning and informal, spontaneous sharing, with opportunities for critical self-reflection.

Just as students keep journals in order to explore cross-cultural encounters in the context of their own backgrounds, teachers can become more aware of their teaching practices (and own cultural biases) through reflection and narrative inquiry. Sharing with peer collaborators one's critical reflections deepens the individual teacher's perspective and enriches the conversation for all involved (Egbert, Paulus & Nakamichi, 2002). Knowledge co-constructed in this way is likely to prove both more immediately useful and more sustainable. One of the benefits of involving teachers in critical inquiry and action research is to have more longer-term, classroom-connected studies in contrast to the short-term nature of most published CALL research.

For teachers engaged in online teaching, development of a teacher's sense of herself as an online teacher is crucial, as White and Ding have written, "The most crucial challenge for teachers taking up e-language teaching comes not from changes in knowledge, roles, skills, and practices per se, but from challenges to teacher identity and teacher self in each of these domains" (2009, p. 334). Such changes are personal and difficult, and the challenges facing L2 teachers should not be easily dismissed. Motivating L2 teachers from the outside—supervisory pressure, continuing education requirements, etc.—is likely not sufficient. Observation syndrome (ramping up ahead of a classroom visit) leads to short-term changes, which may vanish soon after. Studies of teacher motivation show that teachers need to incorporate the new desirable knowledge or behavior into their own image of themselves as future or ideal teachers (Kubanyiova, 2009; White & Ding, 2009). It's important for the profession to have an image of the ideal L2 teacher for the purposes of teacher training: highly technology literate, actively involved in researching and experimenting with new approaches, committed to cross-cultural understanding. At the same time, we have to be honest about expectations and consider the conditions under which L2 teachers work, which vary dramatically and, in many cases, are far from optimal. In one study dealing with teacher educators in Syria, teacher participants overwhelming commented that in their country there were too many computers, with the implication being that with so many pressing social problems, computer-assisted language instruction did not rise to the top of their concerns (Albirini, 2006). Goals should be set for teacher training which encourage and enable teachers to become "transformative intellectuals" (Johnson, 2006, p. 249), while we also maintain a perspective that respects moral-ethical concerns and takes into consideration the real lives of teachers.

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