EMERGING TECHNOLOGIES

LOOKING BACK AND AHEAD:
20 YEARS OF TECHNOLOGIES FOR LANGUAGE LEARNING

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INTRODUCTION

Over the last 20 years I have written 48 columns on "Emerging Technologies"; an additional six columns have been written by guest columnists. Some topics have been one-offs, such as study abroad (Vol. 20, Num. 1), MOOCs (Vol. 18, Num. 3), or WebQuests (Vol. 8, Num. 3). More often, the same topic was revisited, as technologies evolved, as has been the case for video production and delivery (Vol. 1, Num. 1; Vol. 2, Num. 1; Vol. 11, Num. 1; Vol. 16, Num. 1) or mobile technologies (Vol. 2, Num. 2; Vol. 11, Num. 3; Vol. 12, Num. 3; Vol. 15, Num. 2). Several topics have been re-examined in regular intervals of approximately five years, namely digital literacy (Vol. 4, Num. 2; Vol. 10, Num. 2; Vol. 14, Num. 3; Vol. 19, Num. 3) and web technologies (Vol. 1, Num. 2; Vol. 4, Num. 1; Vol. 9, Num. 2; Vol. 14, Num. 1). Many columns have encompassed more than one area of technology or pointed to multiple possible uses in language learning. This makes categorization somewhat difficult, but as I look back at the columns since 1997, there are three general themes which emerge: *the fundamental affordances of technology for language learning* (skills or components of language acquisition, digital literacy, learner autonomy), *teaching and learning contexts and approaches* (online learning, social media, tutorial CALL), and *delivery and design considerations* (technology standards, web design, mobile devices, multimedia). Each of these categories has seen approximately the same number of columns, from 15 to 17 each.

FUNDAMENTAL AFFORDANCES OF TECHNOLOGY FOR LANGUAGE LEARNING

The single largest group of columns in this category (eight) deal with issues of digital literacy and learner autonomy. Following the particular interest of *Language Learning & Technology* (*LLT*) cofounder Mark Warschauer, there have been more special issues of *LLT* dedicated to digital literacy (Vol. 4, Num. 2; Vol. 10, Num. 2; Vol. 19, Num. 3) than to any other single topic. The importance of this topic has increased with the explosive growth of online resources and services on one hand, and the growing conviction of language educators on the other hand, that we should be preparing students for a globalized, multilingual world. In that new world, knowing how to use online tools and services for learning a new language is of crucial importance. That includes explorations of the many different forms of electronic communication in use today. With the proliferation of digital media, including its ease of use and ease of access, the kind of literacy needed goes beyond reading and writing to incorporate use and manipulation of graphics, sound, and video, as well as how and when they are combined in different ways (from online graphic novels to YouTube mash-ups). One of the points I have tried to make in columns on literacies is the need to make students aware of issues using online media that go beyond technical know-how. These includes ethical (and sometimes legal) concerns surrounding borrowing and reuse, as well as general issues of fairness and access. As a case in point, I recently showed my current students an article titled "The Importance and Use of New Technologies in Acquiring Foreign Languages" (Kelemen, 2014), which was specially recommended to me (based on my profile) by Google Scholar. Upon reading the article, I realized that it was, with the exception of minor changes in the first and last paragraphs, an unacknowledged word for word copy of an *LLT* column of mine (Vol. 17, Num. 2). Digital literacy

includes understanding that we can not always take at face value what we discover online. The incident is a reminder as well that algorithmically generated recommendations do not pass through any kind of ethical filtering.

I have found in recent years, both in my teaching and writing, that I have become more aware of the importance of raising issues around cultural appropriateness and metalinguistic awareness in the use of technology in teaching and learning. That translates often into discussing the constraints and opportunities of different kinds of online participation and communicative tools. In terms of language use, that means pointing out that, in particular online contexts, grammatical accuracy or near-native pronunciation may not be as important as pragmatically appropriate utterances or the ability to understand and follow genre conventions. That point is, in my experience, sometimes hard to get across to monolingual US students. I have found, among my students, that folk wisdom concerning best language learning practices (see Miller & Ginsberg, 1995) in teaching and learning dies hard. Explaining the nature of language is less effective than using the power of the internet to have students directly experience real-world conversations with other L2 speakers. This can be as eye-opening an experience for some students as a trip abroad. An essential element in the digital world is the ability to learn from others, picking up clues from close observation and possible missteps, adjusting one's language use to different contexts. Establishing different sides to one's online persona is needed in a world in which "much of their [students'] personal and professional use of their second language (L2) will be in online environments" (Chun, Kern, and Smith, 2016, p. 67).

I have argued, following Hubbard (2004), for the importance of learner training in the use of technology, as well as for the essential role of the teacher in that process. While this is of the most importance for languages where there tend to be fewer learning resources available (Vol. 17, Num. 1), I assert in the most recent column on digital literacy (Vol. 19, Num. 3) that all language educators should be actively involved in helping students find and use appropriate online learning resources and tools. This is all the more the case given the great variety of opportunities available today through social media, multi-player gaming, participation in online affinity groups, or using language learning services. The different forms and genres of online communication have the added benefit of exposing students to a variety of registers in the target language, especially current informal speech conventions, unlikely to be introduced in the classroom or textbooks. The cultural insights through online exchanges can be immeasurably valuable (Vol. 17, Num. 2). Digital literacy today is of course a moving target, traveling at breakneck speed. Some might argue that with the ease-of-use and growing ubiquity of smart handheld devices, with their shallow learning curves in areas such as video capture and editing or multimedia blogging, user training will be less necessary in the future. That may be even more the case with the advent of immersive technologies down the road. However, the ability to deal comfortably with general-use tools does not necessarily translate into competence where language learning applications are concerned (Hubbard, 2013).

The recent *NMC Horizon Brief*, *Innovating Language Education* (Adams Becker, Rodriguez, Estrada, & Davis, 2016), lists the difficulty in blending formal and informal language learning as a current challenge. In the more recent of two columns written on digital literacy for teachers (Vol. 19, Num. 1), I argue that language teachers play a vital role in both encouraging our students to explore extramural learning activities and finding ways to assist and assess the learning achieved. This issue is by no means limited to L2 learning. The 2016 *NMC Horizon Report on Higher Education* in the US (Johnson et al.) lists the blending of in-school and out-of-school learning as one of the major challenges in education today. It is more important than ever for students to gain the skills, knowledge, and motivation to be autonomous learners (Vol. 15, Num. 3), being able to find and use the learning approaches and resources that suit them best. An essential role of language teachers today is to empower students in that direction. That can mean curating resources as well as teaching students how to curate. In a recent piece in the *Modern Language Journal*, Chun, Kern, and Smith (2016) ask if teachers can reasonably expect students to use tools they do not use themselves, giving the example of urging students to tweet if the teacher is not using Twitter.

Unless the teacher has a good understanding of the affordances of a given tool or service, how can its use be reasonably assessed? In fact, with the proliferation of language learning tools and services, some will inevitably be better suited than others for particular student needs and preferences. This is an area where networking and peer-to-peer advising and evaluation can be invaluable, as can be students' reflective journals or learning diaries (Vol. 12, Num. 2; Vol. 17, Num. 2). Weighting students' helpfulness to others (through tweets, blog posts, or other means) can be one factor in assessing student performance. We are now seeing helpful studies on some of the popular language learning services, such as Livemocha (Lin, Warschauer, & Blake, 2016) and Rosetta Stone (Lord, 2015). Of particular interest would be studies following students longer-term as well as those using such services for language maintenance.

Given the nature (and title) of this column, the starting point has most often been a specific technology, tool, or service, with the column exploring the possibilities for language learning. In some cases, however, the columns are oriented around particular skills such as reading (Vol. 7, Num. 1; Vol. 11, Num. 3), speaking (Vol. 3, Num. 2; Vol. 13, Num. 3), listening (Vol. 1, Num. 1), writing (Vol. 12, Num. 2), vocabulary (Vol. 14, Num. 2), grammar (Vol. 13, Num. 1), assessment (Vol. 5, Num. 2), and culture (Vol. 17, Num. 2). Chun, Kern, and Smith (2016) point to the fact that writing on technology can have a short shelf life, and that is likely the case for many of the early columns on specific tools or approaches which have either become outdated or become so ubiquitous as to be "normalized" in language teaching (Chambers & Bax, 2006). In the second half of the 1990s, when the journal was first published, many of these uses of technology for skill development were novel, with emerging and competing technologies. The first column, for example, highlighted an intriguing new approach to audio and video delivery—streaming—and discussed the importance of RealAudio. While RealAudio has faded into oblivion, streaming has become so common as to go unremarked. Today, the easy availability of proofing tools, machine translation, and assistance from online "language buddies" complicate assessment of student proficiency skills that are not demonstrated face-to-face. With the widening use of online and hybrid instruction in second languages (one of the trends mentioned in the *NMC Horizon Brief*, Adams Becker et al., 2016), individual student assessment is an issue that is likely to remain with us. Surely, the answer is not to try to limit students' use of online resources—a meaningless prohibition—but rather to leverage their use to ease and accelerate language acquisition. If we are preparing our students for competency in a multilingual world, knowing how to find and use appropriate resources is more valuable than having memorized irregular verb conjugations.

LEARNING AND TEACHING CONTEXTS AND APPROACHES

In the mid-1990s a new technology brought considerable interest to language educators: the World Wide Web. A good many columns have dealt with web-based language learning, including web authoring (HTML and JavaScript) and content delivery (client server issues and streaming). This was particularly the case in the first 10 years of the journal when web authoring was new. Particular attention was paid to the possibility of interactions, including the use of plugins for multimedia playback and especially the use of JavaScript for client-side interactivity (Vol. 1, Num. 2; Vol. 8, Num. 1; Vol. 9, Num. 2). When it was first introduced in 1995, JavaScript was simple to use and learn, embedded in the HTML code of the webpage. Today, JavaScript, most often referencing extensive JS libraries such as jQuery, is used to develop highly complex web applications which pool resources from the cloud and allow for highly dynamic interactions on the page. HTML5 (Vol. 10, Num. 1; Vol. 18, Num. 1) provides an exciting platform for development of language learning resources, given its native playback and manipulation of media (without plugins), support for advanced style properties, and extensive multilingual capabilities. However, in 2016 it's much less likely than it was in 1997 that *LLT* readers or language educators generally will be writing their own HTML or JavaScript. There have long since been web editors (Vol. 4, Num. 1) which make it possible to develop web pages without learning HTML.

In most cases today of instructed language learning, the web presence of a course will be within a

learning management system (LMS, also labeled a virtual learning environment or VLE), which frees the instructor from learning HTML or any other underlying web technology. LMSs have become popular because they provide an easy-to-use template system for managing course-related tasks such as scheduling, making assignments, distributing documents, giving online quizzes, and keeping track of grades. In the last decade, LMSs have integrated capabilities often associated with Web 2.0 such as blogs and wikis. In recent years, ever more sophisticated features such as learner analytics, multimedia manipulations, and mobile delivery have been added, in part at least, to compete with MOOC delivery systems such as Coursera. I share others' misgivings over the practice of automatically turning over the virtual version of a course to a system that remains essentially static and hierarchical, as I've expressed in several columns (Vol. 13, Num. 2; Vol. 16, Num. 2; Vol. 18, Num. 3). That concern comes despite having co-created one of the early LMSs, "Web Course in a Box" (Godwin-Jones, 1999). Using an LMS tends to send the message to instructors (and students) that the capabilities of the Internet are contained within that system, thus potentially discouraging experimentation and creativity. At the same time, the reality is that at most institutions, technical support is provided only for the LMS, not for projects seeking to break out of that mold. An appealing approach is to create a hybrid course site, using the management tools of the LMS, but linking out of the LMS shell to services and content residing on the open web. Maintaining online portfolios, blogs, and curated resources in openly accessible locations provides continued access beyond the course (and after graduation), an important consideration for digital literacy and life-long learning.

The main driver in reducing the importance to language educators of learning the mechanics of web authoring is the rise of social media in the last decade and its incorporation into language learning. The use of blogs and wikis (Vol. 7, Num. 2; Vol. 10, Num. 2) has been widespread in language learning, as has been the interest in other kinds of peer-to-peer networking and online communication including teleconferencing (Vol. 9, Num. 3) and online gaming (Vol. 18, Num. 2). It is telling that the top Google search result for my column in *LLT* is to the piece first exploring Web 2.0 tools including blogs, wikis and RSS feeds (Vol. 7, Num. 2). Today in computer assisted language learning (CALL), socially mediated activities have become widespread as the communicative approach to language learning emphasizes actual, active language use over decontextualized practice with elements of language. Still, interest in tutorial CALL persists, particularly if integrated into social environments (Vol. 11, Num. 2). A development in linguistics research that benefits the effectiveness and integration of tutorial CALL is the high degree of interest in corpus linguistics, as applied to language learning (Vol. 5, Num. 3; Vol. 12, Num. 1). The greater availability of language corpora—including collections of learner language—enable quite sophisticated uses in the construction of intelligent language tutors (Vol. 13, Num. 1). The real-world nature of language captured in corpora holds promise for interesting developments in areas of language learning which are both important and difficult to teach, namely collocations and pragmatic language use (Vol. 20, Num. 1). It also, of course, is of great benefit in content-based language learning (Vol. 12, Num. 1). The *NMC Horizon Brief* (2016) highlights the growing importance of data-driven learning, adaptive technologies, and personalized learning—all components of corpora-based smart language tutors, which are likely to drive further development in this area. Advances in artificial intelligence (AI), as demonstrated by the recent Google DeepThink victories in the GO game competition, are likely to lead to future breakthroughs in AI-related areas such as natural language processing, the main inhibitor in the past of effective machine-based language learning. Guest columnists have written about the use of AI, in the context of chatbots (Vol. 10, Num. 3) and robotics (Vol. 16, Num. 3). This is likely to remain an area of increasing interest well into the future.

DELIVERY AND DESIGN CONSIDERATIONS

One of the other areas highlighted in the 2016 *NMC Brief* (Adams Becker et al., 2016) is the growth of open educational resources (OER) in language learning, referencing such ongoing initiatives as

LangOER, COERLL, and Merlot. One of the key enablers of OER is the adherence to accepted standards in their creation and delivery. The large number of columns devoted to technology standards implementation (Vol. 3, Num. 1; Vol. 5, Num. 1; Vol. 6, Num. 2; Vol. 8, Num. 2; Vol. 18, Num. 1) point to my own interest in this area. This has arisen in part from my work in the pre-web days, both as a software developer and administrator. For a while I was working in both HyperCard and ToolBook, respectively for Mac and Windows users. One of the reasons I, and so many others, first embraced the web as a delivery option (despite the many initial shortcomings) was the fact that it brought to an end the platform wars. The web ultimately solved (through the introduction of Unicode and HTML5) one of the other persistent problems of early CALL: being able to display and interact with non-Roman alphabets. For those who did not live through these early days, it's hard to fathom how much time, energy, and ink went into debates about on-screen character display and over the benefits of Macs versus Windows.

While operating system neutrality still holds largely true for the web today, it's quite different for mobile devices, for which developers must use different programming languages for iOS and Android devices. In my writing and workshops, I have pleaded in favor of using, whenever feasible, web apps for mobile delivery, rather than platform-specific formats (Vol. 15, Num. 2). The open standards route still presents the same level of interactive functionality and cloud access. Web apps can be set up to launch from an icon on the home screen, just like proprietary apps. I argue for the same standards-based approach in creating e-books (Vol. 18, Num. 1). Using *iBooks Author*, for example, results in e-books that can be read only on Apple devices. Using the EPUB specification, on the other hand, allows display on all e-readers. Since the EPUB format is built on HTML5, the content will already be in a compatible format in most cases. While web-based delivery has remained the norm, both for online language courses and dedicated language resources, mobile delivery has become a must-have ancillary.

The rise of smart phones and tablets is reflected in the relatively high number of my columns in this area (Vol. 2, Num. 2; Vol. 6, Num. 1; Vol. 7, Num. 1; Vol. 12, Num. 3; Vol. 15, Num. 2), along with a guest column by George Chinnery (Vol. 10, Num. 1). The 2016 *NMC Horizon Brief* (Adams Becker et al.) highlights the use of mobile devices in language learning as a growing trend. The appeal is not just convenience and access, but also the potential for personalized learning. The *NMC Horizon Brief* also emphasizes the importance of "deeper learning", directly engaging students in real-life contexts. This could involve project-based learning, in which students collaborate on a task (Vol. 13, Num. 1), a common approach in communicative language learning. Mobile devices are well-positioned to enable this functionality, as demonstrated in recent location-based games (Vol. 18, Num. 2) and study abroad apps (Vol. 20, Num. 1). Mobile devices allow for both localization and personalization. Given the contextual nature of language learning, they provide an optimal environment for learners, particularly given their communicative and media production capabilities. As handheld devices gain both screen size and processing power, along with ever faster networking, there seem to be no barriers on the horizon for deploying advanced apps such as intelligent language tutors, which could run as well on smartphones as on desktop computers. Individual progress could easily be maintained on the cloud, so that the system could make remedial or sequential materials available as appropriate. Such systems already operate, although on a smaller scale, in apps such as Anki for vocabulary learning (Vol. 14, Num. 2). We all experience (unsolicited) personalized attention every time we use a web browser. If the internet can be used to keep track of our shopping needs, travel plans, and love lives, wouldn't it be great if that personalization could be directed to something more productive than marketing?

One of the advances in mobile technology that has been a boon for language educators is in the steadily improving capabilities for media capture. Increasingly, smartphones provide the ability not only to capture images, sound, and video, but also to edit and use them to create slideshows, collages, illustrated variations, and other mixed media. This is a tremendous asset for project-based language learning, such as in the creation of video-enhanced neighborhood profiles, recordings of illustrated oral histories, or the practice of digital storytelling (Vol. 16, Num. 1). One can imagine increased use in both location-based

language learning and study abroad. Multimedia in general has been a frequent topic of these columns (Vol. 1, Num. 1; Vol. 2, Num. 1; Vol. 3, Num. 2; Vol. 11, Num. 1; Vol. 13, Num. 3; Vol. 16, Num. 1), particularly in the early days of the journal, when digital audio and video were evolving quickly; Joe Terantino contributed a guest column on the use of YouTube (Vol. 15, Num. 1). As in other areas, I have argued in favor of a standards approach to the use of media, cautioning, for example, about the use of Flash in language courseware (Vol. 11, Num. 1). Fortunately, the wide-spread acceptance of MP4 and HTML5, with their interactive capabilities, has resolved that issue. Let us hope that in the development of advanced media capabilities such as augmented reality and immersive technologies, there will be a quick shake-out of different approaches leading to a de facto standard, as such environments hold considerable promise for language learning.

CONCLUSION AND OUTLOOK

The topics covered in the 20 years of the column mirror broadly developments in the field of CALL. These include a surge in interest in social media and informal language learning, with an accompanying decreased interest in dedicated software for acquiring specific language skills. Part of the reason for that development lies in the increased use of publisher-supplied online materials which accompany language textbooks, such as Pearson's MyLab or the "supersites" from Vista Higher Learning. At the same time, interest has grown in alternatives to traditional textbooks, given their cost and inflexibility. This has led to a significant interest in OER, particularly if the resources can be adapted to local conditions (see Canagarajah, 2002 and Pennycook, 2010). The importance of the local points to the value of contributions from teacher-researchers, who have to tailor tools and resources to their particular curricular, socio-economic, and linguistic situations (Vol. 19, Num. 1). I find the increased interest in action research (see the *LLT* action research columns starting in 2011) to be a welcome development. At the same time, the rise in qualitative research in our field in recent years also points to the realization that technology can be deployed in so many different ways, that sometimes case histories of class or even individual usage can tell us more than results from pre- and post-testing or other quantitative analysis.

The possibility of adapting resources to local needs and conditions makes it important that shareable materials be created in open, standardized formats. The inability to customize is one of the main complaints language teachers express over the use of publisher materials. Supplementing commercial language learning texts allows instructors to add in potentially valuable learning materials, such as locally generated learning objects (Vol. 8, Num. 2). The German program at Michigan State University, for example, extends its intermediate level textbook (whose chapters focus each on a city in a German-speaking country) with modules on cities that represent study abroad destinations sponsored by the University (Goertler, 2015). Adding such modules allows for students to prepare in advance both culturally and linguistically (an introduction to the local dialect, for example) for the experience abroad (Vol. 20, Num. 1). A similar example in French from the University of Southern California is discussed in the *NMC Horizon Brief* (Adams Becker et al., 2016). I fear that, unfortunately, such development is increasingly rare in language programs. Online materials development takes time, and is not often professionally rewarded in the same way that other types of research are.

Anyone reading the emerging technology columns will quickly realize that my starting point is most often the technology, not pedagogy or theory. That seems appropriate, given the fact that the rest of the journal reverses that process. While that direction is certainly what makes the most sense (i.e. orienting projects around learning goals and proven pedagogies), sometimes starting with the technology can be revelatory through insights into possible learning affordances. In terms of technical capabilities, the situation today is very different from that in 1997. At that time, I was the director of a unit responsible for instructional technology across the university, and when I met with faculty, we often spoke of the limitations in place for effective computer-based instruction, including slow network access (ok from the office, but dreadful from home), the almost unusable digital video delivery options (small, jerky playback), the limited

interactivity and visual design if using web delivery, and so forth. Today, ubiquitous networking, powerful yet inexpensive devices, sophisticated online design capabilities, and advanced compression algorithms provide an unbelievably powerful infrastructure for instructional delivery. This fact has over time shifted somewhat the focus of these columns. While the first columns largely explored the new developments in areas such as digital video, web design, or multimodal authoring, the emphasis in recent years has moved more toward connections between new technologies and research insights into language learning from work in CALL and applied linguistics. This is related as well to the simple fact that there are many more studies to draw on now, than there were in 1997.

My inclination to look at the nuts and bolts and practical uses when addressing technology (I still like to peek at the source code when viewing webpages) goes back to a directive I received from the dean of my unit when I first became department chair in 1992; he let me know he expected from my department substantial use of computers in language learning. He was relatively new at VCU himself, having come from Auburn University where the language department was using HyperCard extensively. Discovering that no one in the department had any experience or interest in instructional technology, I found myself to be the unlikely choice to write grants to obtain equipment and software, to learn how to network the computers when they arrived, and to write sample software (HyperCard stacks) I thought would represent easy-to-follow templates. I discovered, to my surprise, that it wasn't enough to show colleagues the benefits of this approach to language instruction, but rather that they needed to be guided step-by-step along the way. That's been largely my approach in writing these columns: trying to break down new tools and services to see their underlying logic, to appreciate what new opportunities they provide, and to explore possibilities for implementations in language learning.

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