



Twenty-five years of emerging technologies

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APA Citation: Reinhardt, J., & Oskoz, A. (2021). Twenty-five years of emerging technologies. *Language Learning & Technology*, 25(3), 1–5. <http://hdl.handle.net/10125/73442>

Introduction

Only defining itself as "Computer-Assisted Language Learning" in the 1980s (Higgins, 1983), the field of CALL is still relatively young, with origins in the post-WWII computer revolution, programmed learning, and applied linguistics. From its beginnings, CALL has built its identity not on a fixed set of foundational technologies, but on its ability to adapt language learning theory, research, and pedagogy to new digital technologies as they emerge and evolve, from HyperCard, command lines, and video laserdiscs in the 1980s to YouTube, smartphones, and virtual reality today. This evolving landscape has been chronicled in the *Language Learning & Technology (LLT) Emerging Technologies* column ever since the founding of the journal in 1997. The topics of the columns, written by Robert Godwin-Jones (and an occasional guest author), have ranged from dynamic web page creation in 1998 to digital gaming in 2014, thus capturing the emerging identity of the field. In recognition of the 25th anniversary of *LLT*, this special issue, edited by us along with Godwin-Jones, focuses on how CALL technologies have emerged over time, developing interdependent relationships with the epistemologies and purposes of CALL research and practice.

As the first generation of CALL scholars have now retired and the field has matured, scholars today have a historical record of emergence and evolution to examine. With regards to specific technologies, they might inquire what was predicted for the future of CALL and how those predictions played out. They might find that some technologies, when they first appeared, were predicted to be very promising, but that they were never widely adopted before becoming superseded by others. Other tools had potentials that were at first not recognized, but later became indispensable. Whether random or responding to predictable hype cycles, the rate of change and development seems to be continually accelerating and expanding from the domains of work and school to those of home and everyday life. CALL technologies are in dynamic, ecological, and dialectical relationships with multifarious societal, economic, educational, cultural, and industrial forces and agents, co-evolving with human civilization (Arthur, 2011). As products of this ongoing cycle of evolution, often construed as disruptive revolution or 'Technology (current number plus one)-point-oh', CALL technologies seem to be permanently emergent, in that they are "in the process of coming into being or becoming prominent", as Google defines the term. Adaptation to technological novelty and instructional innovation have thus become hallmarks of CALL practice.

Early discussions in CALL debated how to respond to and accommodate the emergent and ever-changing nature of the medium. For example, Salaberry (2001) was concerned with a perceived tendency of CALL practitioners to engage in 'technology-driven' language teaching, whereby new technologies were used simply because they were novel, without adding proven value to the learning experience and contributing positively to learning outcomes. Still today, scholars continue to warn about jumping "from digital bandwagon to digital bandwagon with eyes solely on the newest technology 'affordances'" (Levy et al., 2015, p. 5), advising focus on the more permanent pedagogical design principles and learning theory that underlie practice. The temptation remains, however, as the technology industry continues to churn out new products, appealing to CALL practitioners expected to remain abreast of current trends.

A response since the beginnings of CALL has been recurrent calls to ground practice in learning theory

(e.g., Chapelle, 1997), rather than let it simply be reactionary to technological innovations. The very first *LLT* was a special issue on "Defining the Research Agenda", in which cases were made (e.g., Ortega, 1997) to infuse CALL scholarship with the goal of critically examining SLA precepts, not just as theoretical frameworks to interpret results, but to test the theories themselves. Since then, responding to parallel trends in applied linguistics, CALL scholarship has reached across disciplinary boundaries to find grounding not only in SLA but also general education and learning theories, most recently those reflecting the social turn (Firth & Wagner, 1997) and complexity theory (e.g., Hampel, 2019). The result in CALL over time has been continued focus on a growing variety of emergent tools with attention to situating their uses and designs in commensurate theories of learning and pedagogy. This trend towards non-technology-specific topics integrated with learning theory is visible in the evolution of the topics of Godwin-Jones' columns. The first six topics were real time audio and video playback, webpage creation, digital video, mobile computing, web metadata, and speech technologies, all of which are arguably independent of theory. The most recent six were learner autonomy and informal learning, telecollaboration and intercultural communicative competence, virtual reality, bots, blended language learning, and big data, half of which were more theory than technology-driven. Godwin-Jones' column normally aligns with the special issue topic (if there is one), so as *LLT* has moved away from special issues that focus on specific technologies, we believe the trend reflects a growing level of disciplinary maturity. The topics and treatments in the articles in this special issue also reflect this wisdom by capturing the breadth and depth of scholarship vis-à-vis particular technologies as they've developed since those first calls for theoretical grounding, 25 years ago.

The Articles

As is customary in *LLT*, this special issue features Godwin-Jones' insightful column in which, this time, he traces the evolution of electronic resources for language learning over the past 25 years. Although he addresses the arrival and transformative impact of the World Wide Web, the dramatic changes brought on by mobile technologies, and a trend towards commercial and all-in-one solutions to online learning, he also argues that consideration of current research in SLA should be central to our choice of learning materials and pedagogical approaches. Godwin-Jones takes a critical approach by acknowledging, for example, the potential of the web to provide access to L2 materials or engage students in telecollaborative encounters, when at the same time, he highlights the dangers of online misinformation that can affect L2 learning. Importantly, he reminds us that whereas technology in and of itself cannot solve the world's problems, when used judiciously it can enhance language learning, cultural understanding, and human relationships, which as a result can benefit both individuals and society as a whole.

In the first article of this special issue, Boulton and Vyatkina take a longitudinal look at the development of *data-driven learning* (DDL) since 1989 by conducting corpus analyses of 489 studies, concluding that although the number of empirical studies has increased substantially since then, earlier calls for more theory-led studies and more attention to higher-level skills still hold. Conducting keyword analyses of time period subcorpora, they examined how the scope of research and future trends shifted over time, finding that, for example, keywords related to constructivist theories become more dominant over time but that other trends remained relatively stable. They argue that there is evidence to conclude that while DDL has in many ways become more established in CALL and that it can be effective as a learning tool, studies tend to be less quantitatively rigorous, more focused on English, and less nuanced and comparative than they might be.

In the next article, "L2 pragmatics and CALL," González-Lloret highlights how technology can provide environments that expose language learners to a wide variety of sociopragmatic situations and contexts to test and develop their L2 pragmatic competence. In her article, she presents a historical overview of the tools and digital spaces (e.g., computer-mediated communication tools, games, synthetic environments, social spaces) that have been explored for the teaching and research of L2 pragmatics within and outside the classroom. She also underlines the wide variety of pragmatic features (e.g., speech acts, politeness,

inference, interactional moves, identity) examined when learners either comprehend or produce the language. Furthermore, the article approaches the diversity of studies in terms of length (from one class period to longitudinal studies of a few weeks or months), research design (from observational studies to interventional studies), data collection and quantitative/qualitative analytical methods from experimental research in the fields of L2 pragmatics (e.g., discourse completion tests, judgment tests, role-plays) and applied linguistics in general (e.g., pre and post-tests, reaction times, questionnaires, interviews, discourse analysis). As we move towards the future, González-Lloret anticipates areas of research that include a reconceptualization of L2 pragmatics within a new paradigm of translanguaging practices as well as the inclusion of multimodal interactional analysis.

Following, in “Autonomy CALLing: A systematic review of 22 years of publications in CALL and autonomy research,” Kalyaniwala and Ciekanski conduct a synthetic review of the treatment of autonomy in CALL research over the last 25 years, examining how the concept has been defined and applied in 41 studies. Tracing the shifting definition of *autonomy* over time, the authors argue that its vagueness and a lack of clarity have allowed it to be easily linked to various CALL technologies as they emerge—from self-access to a more relational definition vis-à-vis social context. They found that most studies conducted are case studies, with a balance of quantitative and qualitative methodologies, making use of a variety of restricted, open, or integrated pedagogical approaches. They found a drop in the number of studies of autonomy in formal learning over time, along with a rise in the number of studies of informal, non-formal (i.e., semi-structured), and ubiquitous learning contexts, explaining the more recent increase as due to a concomitant increase of online use of informal language-learning resources. Kalyaniwala and Ciekanski conclude with the observation that the diversity of study parameters and definitions of autonomy make older, pre-Internet definitions of the concept less applicable and less relevant to informal learning environments.

In our fourth article, “25 Years of Digital Literacies in CALL,” Kern examines how the concept of *digital literacies* (DLs) has developed over the last 25 years, discussing how research and pedagogy focused on DLs have contributed to our understanding of constructs related to individuality (i.e., agency, autonomy, and identity), to creativity, and to new sociality and communities. DLs entail new opportunities to practice agency, develop autonomy, and express identity, often through new forms of creative expression like multimodal storytelling, fan fiction, gaming, and maker practices. These practices also involve new forms of sociality and push the boundaries of how we define and understand learning contexts. Kern argues that the shift from Web 1.0 to Web 2.0 in the early 2000s led to a complexification of DLs; for example, from monomodal to multimodal composition, and from solo to collaborative authorship. While this has contributed to a sense of global interconnectedness, it has also resulted in the spreading of misinformation and brought forth new issues related to privacy and ownership, renewing the need for critical pedagogies. In response, Kern argues for a framework that emphasizes design, mediation, relationality, and innovation.

In the fifth article, “Twenty-five years of computer-assisted language learning: A topic modeling analysis,” Chen et al. provide an in-depth review of the evolution of CALL research in the last 25 years. To accomplish this overview, the authors combine structural topic modeling, the Mann-Kendall trend test, and hierarchical clustering with bibliometrics (the contributions of different countries, institutions, and publication sources) to examine the status of CALL research and its trends, and to shed light on prominent issues from 1995 to 2019. They illustrate, for example, how CALL research has evolved, reflecting the advances of technology, from glosses/annotations and vocabulary learning in the 1990s to synchronous and asynchronous computer-mediated communication and mobile assisted language learning in the 2000s. The benefit of this overview is that it has the potential to assist researchers and practitioners in understanding the development of the CALL field, its community, and its main research interests.

Finally, in “The Evolution of Language Learner in CMC: From Scripted Chatrooms to Critical Construction of The Digital Self,” Klimanova examines the historical development of identity research in CALL over the past 25 years, focusing specifically on the social and expressive dimensions of *computer*

mediated communication (CMC). Taking into account the CMC communicative settings, from controlled classroom environments to fan fiction sites, and the theoretical frameworks that have informed CMC in the last decades, Klimanova provides an overview of how the perception of learners' identities has evolved since the 1990s. Klimanova illustrates that while researchers in the 1990s found that CMC provided an environment where the instructor's role was decentralized and more learner-centered, in the first decade of the 2000s there was a shift to public spaces (e.g., online forums, social networks, massive multiplayer games) that empowered L2 learners by providing them opportunities for a balanced and egalitarian communication and where learners could explore their language-speaker identity. Finally, in line with the upsurge of identity research in applied linguistics, the past decade has seen how CMC-mediated identity research has begun to examine increasingly informal, non-educational contexts and propose new epistemological and analytical frameworks. As we move forward, Klimanova identifies areas of research, including multilingual and translanguaging practices, relating to a variety of devices and non-educational CMC platforms.

Conclusion

In the last 25 years, although CALL has evolved to become more integrated and perhaps more normalized (Bax, 2011) in formal classrooms over time, it has also become not less but more ubiquitous in everyday life and informal contexts, leading to a blurring of boundaries among the times when and spaces where we engage in what we might call CALL. It is a complex field in a dialectical relationship with learning theory and teaching practices, while in a state of perpetual emergence both proactive and reactive to technological, societal, and cultural developments. Taken together, the six pieces of this special issue, along with Godwin-Jones' column, show a field attempting to capture this complexity. In embracing a variety of methodologies, the pieces demonstrate the diversity of research approaches possible, and perhaps necessary, in order to capture any sense of synthesis or comprehensiveness. It may be impossible to predict exactly what CALL will concern itself with in another 25 years, but if it continues to be as innovative, adaptable, and dynamic as it is portrayed to be here, it will surely be healthy.

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