



## The Evolution of CALL

The growing need for proficient speakers of English in a world where English is the medium of knowledge transfer has put CALL in the spotlight. This paper is a brief overview of its recent history, from its early over-emphasis on technology to its present coming-of-age, its growing links to learning theories, and its promises for the future.

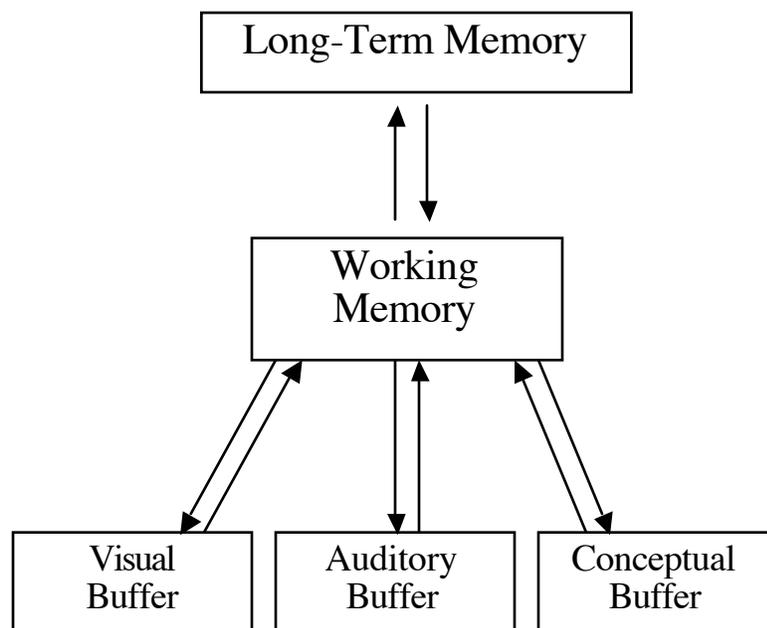
In its first days, CALL was driven by technology and technologists. Proponents of CALL tended to focus on the “Computer Assisted” portion of the acronym rather than the “Language Learning” portion. Technology seemed to offer solutions that could be plugged-in and delivered through a box and game-like interactions. Learning would be fun and relatively effortless, and the role of teachers would diminish.

However, technical limitations and the lack of a reliable delivery and support infrastructure led to an adventurous but unstable environment where much money was wasted. Institutions invested in systems that were either underutilized or were used in ways that had little if any benefit for education other than to keep students occupied and labs appearing to be modern. As for teachers, they were seldom consulted or provided with training, partly because there were few in academia with relevant experience and partly because teachers,

with justification, regarded CALL with scepticism and fear. There was an implicit belief that teachers and CALL were competing for the same role -- CALL versus classroom-only -- rather than in a partnership where each approach “assisted” the other.

What was missed by many in the early days of CALL was the recognition that the most effective use of technology is not just to do old things in new ways. Rather, the real opportunity was to examine how the new tools of technology had broken through the page and text barrier, allowing the development of a new range of listening-based interactions. This created theoretical opportunities for fundamental changes in language learning. What was needed was a learning theory and a model to *guide* the application of technology.

Recent research in the neural sciences provides many insights into how learning takes place and how language learning may be optimized. In particular, it supports the view that multimedia exercises can be designed to take advantage of how neural processes work together in the learning process. Figure 1, for



**Figure 1**

example, is an oversimplified diagram that shows how various processors in the brain communicate with the *working memory*, which is instrumental in the learning process. The key point in the figure is that multiple processors, such as the visual, auditory, conceptual, phonological, and others, are involved and can be activated in well-designed exercises. Research shows that these processors work in parallel in the unconscious and interact with the working memory to piece together and interpret language and sensory input. The nature of these interactions can provide valuable insights for both the design of learning exercises and for coaching learners how to use more effective practice strategies.

The activation of multiple processors at the same time, for example, can increase the probability that cells wire together to form the mechanisms that lead from comprehension to automaticity and long-term learning. This process generally requires frequent repetition over an extended period of time and in an order that respects the underlying organization of language elements and processes within the brain. As the neural psychologist Steven Pinker states, competence comes from practice. Competence, whether in language or mathematics, is “learned by fitting together overlearned routines.” Mastering it, Pinker asserts,

*...is deeply satisfying, but it is a reward for hard work that is not itself always pleasurable... Without an understanding of what the mind was designed to do in the environment in which we evolved, the unnatural activity called formal education is unlikely to succeed. (How the Mind Works 342)*

Guided by research, learning theories, and by actual classroom experience, CALL is now moving toward a blended model where the computer provides the necessary optimal input and practice activities, and the classroom provides the human element -- accommodating and utilizing the needs and lives of the learners in a social context.

Viewed from this blended model, both classroom and multimedia activities play an essential role. Without the social environment of the classroom, learning is

tedious, unmotivating, and too restrictive to meet the needs of learners. Typically, drop-out rates are 80 percent or more in e-learning environments where little or no classroom support is available. On the other hand, without the effective practice provided by well-designed computer courseware, language learning is slow, painful and discouraging, a fact borne out by the results of traditional language learning which suffers from a lack of practice and an over emphasis on memorization and conscious rule learning.

In our experience, the blended model can reduce language-learning time by 50 percent or more, depending primarily on the following variables:

1. Scheduling of practice sessions for optimum frequency and duration.
2. Quality and design of practice sessions, supported by coaching, feedback, and suitable learning tasks that can lead to automaticity.
3. Sequencing of content and an appropriate mix of skills so that the strategic support elements of language are developed in a well-designed learning path.
4. Classroom sessions that provide extension and personalization of the language models, including the assignment of reading and writing exercises.
5. Suitable technical infrastructure and support.

Of course, control of the above variables requires the cooperation of several departments in an organization. Political will at the top is generally required to bring the departments together, each with their own agendas, needs, and areas of expertise. Scheduling, for example, depends on the IT department for support, the limits and economics of the technical infrastructure, the physical classroom design, and the cooperation and support of teachers.

Once the infrastructure is in place, teacher-training is generally the most important factor in the success or failure of a CALL initiative. In our experience, without a reasonable amount of teacher training, teachers are unclear about their role and are uncomfortable with any courseware that is adopted. As a result,

students fail to receive the orientation and coaching necessary to get the most out of their study. We see this clearly in the study-records of several institutions.

Without coaching, most students practice in ways that are ineffective, for example by over-relying on text, not recording and monitoring themselves, or leaving a lesson prematurely without understanding the importance of frequent practice and review.

Given the problems inherent in implementing a large-scale CALL program, price and accountability are also important factors. A high-priced product with value can end up being much less expensive than a lower-priced product with little or no learning value. However, common metrics of number-of-hours or vocabulary-size or number-of-lessons are not indicators of language-learning value. If Product A provides 300 hours of effective learning activities to produce the same increase in language proficiency as Product B which provides 600 hours to produce the same increase, then Product A is less expensive even if its cost per hour is 40 percent more than Product B. The metric for determining value should be proficiency gain, not cost per hour. This can often be confirmed in a well-designed pilot program or by examining data that supports the claim of a courseware provider. Quality and effectiveness matters and it can be demonstrated.

In our own courseware and in our Records Manager, we have developed the *Completion Percentage* as a means to assess how well students are using each lesson. The Completion Percentage is a measure of the number of *micro-learning-steps (MLS)* that a student has completed compared to a target number for the lesson. A MLS is a learning act that increases language proficiency. We might take our cue, for example, from the neural sciences and define a micro-learning-

step to be one of the following: (1) listening to and comprehending a language utterance, (2) recording and monitoring an utterance with comprehension, (3) processing information and completing a task in the target language, and (4) reading or writing a sentence with comprehension in the target language.

As a first step, it is reasonable to assume that learners will progress more rapidly in a language-learning session where they complete a larger number of MLS than in a session where they complete a smaller number of MLS. If this is true, then the cost per MLS would be a more suitable metric than the cost per hour of study. An hour of study, after all, can be almost devoid of any meaningful language-learning activity, especially when a student is half asleep.

Students who have been properly coached increase their Completion Percentage scores more quickly than students who have not been coached. In this sense, the Completion Percentage averages for a class can help determine whether teachers are coaching their students effectively. To further assist in this process, we have developed specialized monitoring software, the *Intelligent Tutor*, which combs through the details of each student's learning activities and summarizes the results so that teachers can identify which students need additional coaching. In addition, the *Tutor* provides specific suggestions about how each student might improve their practice strategies.

For developers such as DynEd, the challenge is to continue to modify and adjust lesson designs and metrics such as the Completion Percentage so that we can optimize language learning and make it more cost-effective. Feedback from well-informed teachers, students, test results, and study records from around the world will continue to suggest new patterns and provide ample opportunities for further research.

As CALL continues to evolve however, teacher-training remains the key challenge. This is partly because of a resistance to change and partly because of under-funding and over-simplification. Unfortunately, the human sides of CALL remain the most unappreciated and neglected parts of the equation, despite their overwhelming importance.

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