REVIEW ARTICLE

COMPUTER-ASSISTED LANGUAGE LEARNING (CALL) AND SECOND LANGUAGE ACQUISITION (SLA)

| Driss Talbi [1] | and | Youssef Ou-sekou [2*] |

[1.] University Moulay Ismail University Faculty of letters & human sciences | Department of English Studies | Meknes | Morocco |
[2.] University Sidi Mohamed BenAbdellah University | Laboratory LISAC FSDM | Fez | Morocco |

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ABSTRACT

The field of computer-assisted language learning (CALL) has been influenced by various theories from disciplines such as sociology, psychology, education, and linguistics, which have sought to illuminate human interactions with digital technology. for language learning purposes. Theories have played a crucial role in understanding the mechanisms by which technology enhances or hinders language learning and have provided a basis for the development of effective CALL programs and practices. However, to use technology effectively in language education, it is necessary to invest not only in the technology itself, but also in training and supporting teachers to make the most of it. A successful training program should be tailored to the individual needs of each teacher, allow enough time for teachers to develop their skills, and emphasize the educational applications of technology rather than the technology itself.

Keywords: *Second language acquisition, computer-assisted language learning, ICT, Teaching.*

1. INTRODUCTION

In the field of second language acquisition (SLA), the use of computer-assisted language learning (CALL) has become an increasingly important topic of research. The integration of technology in language instruction can provide many potential benefits for learners, such as increased access to authentic language materials, opportunities for personalized and self-paced learning, and enhanced engagement using interactive and multimedia elements. However, the field of computer-assisted language learning is in a constant state of change due to its dependence on technology. This causes difficulties for theories, research, and even practices in the field to keep up with these technological advancements. Because of the significance of technology in CALL, researchers must take into consideration the impact that technology has on the learning process, SLA research, and even how and why technology is utilized. Smith [1] concludes that "One of the major challenges in conducting SLA-relevant CALL research is dealing with the seemingly irreconcilable relationship between fast-paced technological development, on the one hand, and our need to fully explore in a principled way whether and how these technologies can be employed to facilitate second language acquisition, on the other hand" [1].The fast-paced nature of technological advancements and the need to evaluate the effectiveness of different technologies in accordance with theoretical and pedagogical developments in instructed SLA pose significant challenges for researchers and educators. The article would first present the fundamental conceptual issues of SLA and CALL. Second, it would offer the role of theory in CALL research, and offer a typology of theory use in CALL, ranging from theory borrowing to theory construction. In the same section, an overview of the three more prevalent theoretical foundations for CALL would be offered: the interaction account, sociocultural theory and constructivism. Third, it would shed light on the role of technology in SLA research through discussing the two different uses of technology, namely technology as a research tool and as a learning tool. The last section would discuss the challenge of conducting SLA-relevant CALL research that is due to the nature of fast-paced technological development, and other logistical and pedagogical challenges.

2. BACKGROUND AND METHODS

2.1 Overview of Second Language Acquisition (SLA)

Second language acquisition (SLA) is the standard term that refers to the study of the process through which people learn anther language or other languages other than their first language. The additional language is called a second language (L2), even though it may actually be the third, fourth, fifth, or the tenth language to be acquired. It is also commonly called a target language (TL), which refers to any second language that is being learned. The field of SLA can include informal or formal L2 learning. The former takes place in naturalistic contexts, the latter, on the other hand, takes place in classrooms [2].

Within the scope of SLA, there is a distinction typically made between second and foreign language acquisition. Foreign language acquisition, on the one hand, refers to the process of learning a nonnative language in the environment of one's native language (learning French or English in Morocco). This is most commonly done within the context of the classroom. Second language acquisition, on the other hand, refers to the process of learning a nonnative language in the environment in which that language is spoken (learning French in France or English in England) [9].

In trying to understand the process of SLA. Applied linguists are seeking to answers to these three basic questions:

*Corresponding author Author: | Youssef, Ou-sekou * |

1. What exactly does the L2 learner come to know?
2. How does the learner acquire this knowledge?
3. Why are some learners more successful than others?

Answering these questions may seem simple, but in fact there is probably no total agreement among SLA researchers. Because the field of SLA is highly complex in nature, and its researchers come from different academic disciplines (linguistics, psycholinguists, sociolinguistics and social psychologists) that differ greatly in theory and methods. Applied linguists specializing in SLA may adopt more than one perspective and are often concerned with the implications of theory and research for the teaching of foreign or second languages. Each discipline uses different methods for gathering and analyzing data and employs different theoretical frameworks and reaches conclusions in different ways [2].

2.2 Overview of Computer-Assisted Language Learning (CALL)

The term Computer-Assisted Instruction (CAI) was coined "when computers first entered education on a relatively broad basis in the early sixties" [3]. CAI is considered the umbrella term for the use of computers to assist in instructional activities in general. It could be applied to any field of study such as Physics, Chemistry, Math, etc. Under this umbrella term Computer-Assisted Language Learning (CALL) concerns the use of technology in SLA. Computer-Assisted Language Learning (CALL) is now considered as a relatively new and rapidly evolving academic field that explores the role of information and communication technology in language learning and teaching. Hubbard defined CALL as "a subfield of applied linguistics concerned with the use of computers to facilitate second language learning and teaching" [4]. CALL has also been known by several other terms such as Technology-Enhanced Language Learning (LELL), Computer-Assisted Language Instruction (CALI), Computer-Aided Language Learning and Technology for Language Teaching and Learning (TLLT). CALL can be said to belong to the field of applied linguistics, and is most closely related SLA, which is itself a rapidly evolving discipline.

Computers first entered education on a relatively broad basis in the early sixties. [6] divided the evolution of CALL into three phases: Behavioristic CALL, Communicative CALL, and integrated CALL (as cited in [7]). Each of these phases was influenced by the technology available as well as the theories prevailing of that period.

The first phase is the Behavioristic CALL, which was conceived in the 1950s and implemented in the 1960s and 1970s, was heavily influenced by behaviorism principles, which posits that language learning is a habit-forming process. This phase of CALL involved repetitive language drills, which is known as drill-and-practice. The materials designed for learners were decontextualized and had limited feedback, and the activities were simply transferred from the classroom to the computer which was viewed mainly as a mechanical tutor. This phase lasted to the end of 1980s.

The second phase of CALL, known as communicative CALL, took off in the early 1980s at the same time behavioristic approach to language teaching was being rejected at both theoretical and pedagogical level, and personal computers with much greater capacities were developed and became available, allowing many people to use video, sound, texts, images and animation at home or in the workplace. Computers were still used for skill practice, but not in a drill-and-practice format and with more opportunities for student choice, control and interaction. Other language skills, such as reading, writing and discussion skills were included more commonly.

The third phase is the integrative CALL started from the late 1990s. During this phase, technology is used to support language learning in a variety of ways. Computers became increasingly networked and widely used in every aspect of a student's life. The invention of the internet and the World Wide Web allowed students and teachers to interact and communicate with each other around the world through networking tools like email, chat, blogs, and social media. This phase also witnessed an increasingly widespread use of mobile technologies.
Warschauer [6] in a later publication changed the name of the first phase of CALL to Structural CALL with a revision of the dates of these three phases.

- Structural CALL: from the 1970s to the 1980s.
- Communicative CALL: from the 1980s to the 1990s.
- Integrative CALL: from 2000 onwards.

3. RESULTS

3.1. Theory in computer-assisted language learning research

Some scholars believe that the theory of CALL is not needed for educators in understanding the use of technology in teaching. Instead, a clear theory of SLA and its implication for learning suffices. Smith [1] claim that "educators do not need a discrete theory of CALL to understand the role of technology in the classroom; a clear theory of SLA and its implications for the learning environment serves this goal" (as cited in [5]). However, Hubbard stated that there is a gap in the area of theory for CALL, and it does not have a dedicated theory yet and it is unlikely that it will ever have a comprehensive one. Instead, CALL draws from a number of sources including SLA theories, learning theories, and others. Hubbard [5] defined CALL theory as follows:
Collectively, CALL theory is the set of perspectives, models, frameworks, and specific theories that offer generalizations to account for phenomena related to the use of computers and the pursuit of language learning objectives, to ground relevant research agendas, and to inform effective CALL design and practice ... a CALL theory is a set of claims about the meaningful elements and processes within some domain of CALL, their interrelationships, and the impact that they

have on language learning development and outcomes (as cited in [5]). [8] discussed various types of theories that are used in computer-assisted language learning, research and practice. They explained that theories may be absent, borrowed singly, assembled in an ensemble, instantiated, adapted, synthesized, and even created.

Theory borrowing:

It is the simplest and most direct employment of theory in CALL study. It consists of taking a theory from another field, such as linguistics, psychology and SLA and applying it to CALL environment without any modifications. Many studies in Computer-Mediated Communication (CMC) fit into this category, with the objective of showing that CMC can facilitate language learning.

Theory adaptation:

Theory adaptation refers to the process that begins with borrowing a theory but eventually change it. This occurs when the researcher recognizes the need to modify the theory's construct considering new data emerging from CALL research results or observations prior to the actual research.

Theory ensemble:

This theory refers to the process of combining multiple theories within a single study to capture their strengths and overcome their limitations, especially in studies involving development and design. "Because no single theory is perceived as rich enough to meet the needs of the research, teaching or development project, rather than change the theory, different sources are drawn on for different purposes" [8].

Theory Synthesis

This involves combining element from two or more theories to create a new single theoretical entity. [9] provided an example of such a synthesis, integrating elements of Chapelle's interactionist account for CALL with Mayer's Cognitive Theory of Multimedia to produce a unified theoretical framework for using multimedia in second language teaching [8].

Theory Construction

This refers to developing a new theory from scratch based on a new data or insights. This can be a challenging process, but it can also lead to new and innovative perspectives on language learning with technology. One example is White's (2005) proposal for a learner-based theory of distance language learning [8].

Theory Refinement

Finally, theory refinement refers to the process of improving or modifying existing theories in the field of CALL. It is based on the idea that theories improve as more data come to support or refute them. Despite the wide range of theoretical sources from various disciplines described previously, theories from second language acquisition (SLA) can be said to have had a more central role than others. Three stand out: the interaction account, sociocultural theory, and constructivism [8].

The Interaction Account of SLA

This theory emphasizes the role of interaction in the learning process. It views language acquisition as adynamic and ongoing process of negotiation of meaning between the learner and their interlocutors whether they are teachers or computer programs. Several CALL researchers have argued for the IA as an appropriate foundation for CALL research. [10] notes that CALL studies have applied theoretical concepts from the IA for a variety of purposes: for example, the IA construct of 'input modification', simplifying or elaborating to make input more comprehensible, has been associated with actions from computer programs such as providing subtitles for listening or definitions from electronic dictionaries or glossaries on demand from the learner [8].

Sociocultural Theory

This theory, developed by Lev Vygotsky, posits that social interactions and cultural context play a critical role in cognitive and language development. According to sociocultural theory, learning is a social process that occurs through interactions with more knowledgeable others, and language development is seen as a process of internalizing the culturally specific ways of thinking and speaking. When the theory of sociocultural is applied in CALL, many new and different forms of social interaction can take place both online and in the classroom.

Constructivism

Proulx [11] viewed constructivism as a movement and system of beliefs in which knowledge is considered to be constructed by individuals through their experiences and interactions with the environment, rather than being transmitted or acquired passively. It is argued that this theory encompasses both cognitive and social perspectives, with the cognitive constructivism focusing on the individual mind and the social constructivism emphasizing the role of social environment and the learner's interactions within it. The centrality of the learner and the role of the teacher in facilitating authentic and motivating learning experiences are key principles of constructivism. Despite its diversity, constructivism offers a different perspective on learning and knowledge acquisition compared to the traditional view of transmission of knowledge [8].

3.2. The role of Technology in second language research

Technology has the capacity to transform the way in which researcher study language learning and development. The use of technology as a research tool and as a medium for teaching and learning has the potential to provide new and innovative insights into the complex processes involved in SLA. The ability to record user interactions and behaviors using computers and other devices offers researchers a unique window into the language learning process. This has the potential to greatly expand our understanding of how individuals acquire a second language and the factors that influence the success of language learning.

Technology as a tool to understand SLA processes

According to [5], references to SLA theories are the most common in CALL research. Much CALL research can be positioned among three of the most recognized theories, including the interaction account, sociocultural theory, and constructivism. Each has been discussed previously in more detail in the section of theory in CALL research. These theories share a focus on the importance of input and exposure to language and communicative contexts, as well as the cognitive and socio-cognitive processes of L2 learners as they interact in the social environments. Different technologies and programs can document communicative processes such as compute-mediated communication (CMC), eyes tracking, and intelligent CALL (ICALL).

Computer-mediated communicative (CMC)

Computer-mediated communicative was originally supported by networked computers using traditional formats such as email and chat rooms. CMC can take different forms such as asynchronous or synchronous and different modes such as text-based, audio-based, video-based, or a combination of these modes. CMC has been used for various purposes including academic forum, social networks, and intercultural exchanges. The recording and storage of these technologies allow researchers to study how students use various technological resources to develop skills such as oral proficiency, negotiation of meaning, peer feedback, and e-politeness. Researchers have also used CMC to compare the use of text-chat and spoken discourse and found that some learners generate more complex language in text chat, while others show greater complexity in spoken discourse.

Eye-tracking

Eye-tracking technology is another technology that is gaining influence in SLA research. This technology affords researchers the ability to capture aspects of learner process data not available during face-to-face interaction. [9] states that eye movements during reading (text-based SCMC) can be used to infer the moment-by-moment cognitive processing of a text by the reader without significantly changing the normal characteristics of either the task or the presentation of the stimuli [1]. Intelligent CALL is another type of technology that can provide detailed, error-specific, and individualized feedback to learners. These technologies have been used to study the impact of learner control on error correction, the acquisition of collocations, and the relationship between speaking tasks and working memory. Recordings of think-aloud protocols can be used to study learner strategies or metacognitive processes. Additionally, online tests of working memory have been used to measure working memory, an important learner variable.

Technology as Mediator of SLA Processes

The impact of technology on second language acquisition (SLA) has been significant in recent years. Technology, through the World Wide Web or internet, allows for exposure to authentic target language input, in the form of multimodal websites that contain text-based, audio, and video information about both language and culture. In addition, the many different types of CMC, often classified as Web 1.0 and Web 2.0 technologies (e.g., email, forums, chats, blogs, wikis, podcasts, videos, social networking sites, virtual worlds, massively multiplayer online games) enable various kinds of communication, interaction, and collaboration, whether between learner and computer or among people (i.e., learners in and outside of the classroom or speakers of the target language anywhere in the world). According to [10] CALL or TLLT as he likes to name, it offers a wealth of benefits to students, teachers, and institutions.

Learners

One of the primary benefits TLLT offers is the wider exposure to English, as learners can extend their exposure to the language beyond the traditional classroom setting through access to a variety of authentic and instructional materials on the internet. TALL also offers increased opportunities for authentic interaction with other learners worldwide and allows for flexible learning at one's own pace and place. It supports different learning styles and skills, making it suitable for learners of different abilities, from beginners to advanced.

In a TALL environment, students take on a more active role in their learning, increasing their sense of autonomy and control over the process and outcomes. TALL can also provide a less stressful environment, as students are not directly compared to their peers and have more control over their learning. It also offers a social context for learning, encouraging collaborative and peer-to-peer learning. Moreover, TALL often increases motivation and engagement and provides access to more engaging materials, such as digital games and YouTube content. Additionally, mobile technologies can support situated learning, where students use English at the point of need, such as while traveling. TALL also offers alternative types of feedback, including immediate or delayed feedback from the program, and opportunities for peer feedback and remote teacher assistance through collaborative tools such as email and chat.

Teachers

The integration of technology and computers into teaching is becoming a mandatory aspect of education in many cases. Despite initial reluctance from some teachers, incorporating technology into the classroom has numerous benefits that can enhance the teaching experience. One of the key advantages of technology-supported learning is that it enables more learner-centered teaching. Teachers can use technology to help students engage with material that interests them and suits their individual needs. This is particularly beneficial in mixed-level classes, as students can work on their own specific areas of need rather than all focusing on the same materials.

By using the internet, technology also expands the classroom to the real world. Students can follow up on topics covered in class and explore authentic multimedia content from the wider world. This enhances the curriculum, as teachers have access to a vast array of content and resources to develop a more diverse and richer curriculum. The use of technology in teaching also provides teachers with a wider range of strategies to use in teaching the four skills and expands their role from being a transmitter of knowledge to being a facilitator of student learning.
Furthermore, technology offers teachers greater opportunities for individual responsibility for their courses and creates a more interactive learning environment for students. Course management systems and learning management systems provide teachers with practical support, such as efficient administration of assessments, grading of papers, and recording of student information. Additionally, virtual teacher groups and networks offer opportunities for teachers to collaborate and share ideas and materials for their continued professional development.

Institutions

The integration of CALL/TLLT has a profound impact on educational institutions. The implementation of computer-mediated learning as a component of a school's curriculum has several benefits. These benefits are not limited to the practical or organizational aspect, but also influence the way the institution and its teachers perceive language teaching. A school's commitment to technology enhances its reputation and sends a message to students, teachers, and parents that it is dedicated to staying ahead of the curve in education and is proactive in providing students with the latest tools for learning. Additionally, technology provides teachers with a more individualized approach to teaching and better learning outcomes for students. This is because students receive additional learning opportunities beyond the usual classroom hours and are able to engage in computer-based instruction according to their interests and needs.
Furthermore, technology enables greater flexibility in the curriculum. With a mix of face-to-face and computer-mediated learning, schools can tailor their approach to best suit the needs of their students. The use of a learning management system (LMS) also simplifies administration and record keeping, reducing the burden of organizing and monitoring courses, attendance, and student learning.

In order to achieve the full potential of TLLT, it is important for teachers and management to collaborate closely and exchange ideas. The most successful examples of TLLT integration in the curriculum are those where everyone works together to implement changes and improve the language-teaching process.

3.3. The challenge of conducting SLA-Relevant CALL Research and other challenges

The field of CALL is in a constant state of change by the very nature of its dependence on technology. As a result of this change, using technology is not without its challenges. One of the key challenges researchers encounter in conducting research on SLA and technology is the conflicting nature of fast-paced technological development and the need to thoroughly understand its impact on language learning. The rapid pace of technological advancement means new tools and platforms are constantly emerging, making it difficult for researchers to keep up with and examine their effectiveness in facilitating language learning. It is essential to conduct thorough research to reach decisions and determine whether and how these technologies can be used to enhance second and foreign language learning. This presents a challenge as it is difficult to balance the need to stay updated with technological advancement while at the same time thoroughly evaluating their impact on SLA. As a result, this challenge highlights the need for ongoing research that can keep pace with technological advancement and provide evidence-based guidance for how these tools can be used to support language learning.

In addition to this challenge above, [10] explained that TLLT/ CALL challenges fall into three categories: Logistical, Pedagogical, related to approach and the process of SLA, and Pedagogical, related to the learning styles, teacher, and teacher training in the implementation of TLLT. Logistical challenges are often due to the lack of IT support at the level of school, including issues such as slow internet connection, insufficient computers, and the huge charges to maintain computer networks. However, logistical solutions do not address the issue of whether technology for language learning and teaching (TLLT) is or is not effective. Despite the research on TLLT is growing, not much is known about the impact of TLLT on SLA. Along the same lines, the design of TLLT activities does not really reflect or based on second language learning theories but rather being driven by the technology.

Most of the time, media developers or companies are fascinated by the opportunity to produce some fancy looking and well-selling products but are only informed and guided by an intuitive notion of how language learning works. Their conceptions of methods are usually more geared towards entertainment than learning. As a result, the market is packed with colorful programs where learners are often put in a rather passive position of doing exercises that someone else has created for them. Such programs rarely offer opportunities for creative use of language [10].

Teachers as well find themselves in the face of these challenges, they need to develop new ways of teaching, take on new roles and responsibilities and provide support and guidance for students in new learning environments. Institutions are also required to invest in training for both teachers and learners to make greater use of TLLT.

5. CONCLUSION

The field of computer-assisted language learning (CALL) has been shaped by a wide variety of theories, which have aimed to shed light on the complexities of human interactions with digital technologies for language learning purposes. These theories come from various disciplines, including sociology, psychology, education, and linguistics, and range from those that have been adopted from other fields to those that have been specifically constructed for CALL. The theories have played a critical role in understanding the mechanisms by which technology enhances or hinders language learning and have provided a foundation for the development of effective CALL programs and practices.

One of the most prominent theoretical foundations for CALL is interaction theory, which emphasizes the role of interaction in language learning and view technology as a means of providing opportunities for language learners to interact with each other and with language input. Another important theoretical framework is sociocultural theory, which views language learning as a social process that occurs within a cultural context and considers technology as a tool for scaffolding the development of communicative competence. Constructivism, another important theoretical foundation, holds that learning is an active process of constructing meaning and that technology provides opportunities for learners to actively engage with the learning process and construct their own understanding.

In CALL research, theories have been used to guide the design and analysis of studies, to provide a framework for interpreting the results of studies, and to generalize findings across studies. In CALL practice, theories have been used by teachers and developers to inform their decisions about the design and implementation of technology-based language learning programs. In recent years, the role of theory in CALL has become increasingly important, as digital gaming for language learning has emerged as a growing area of research and practice. However, to effectively use technology in language education, investment is needed not only in the technology itself, but also in the training and support for teachers to make the best use of it. To this end, in [12] the authors highlights five key points for a successful training program: 1) the program should be tailored to meet the individual needs of each teacher, from basic computer skills to advanced content creation, 2) it should provide enough time for teachers to develop their skills, 3) the focus should be on the educational applications of technology rather than just the technology itself, 4) it should be discipline-specific, recognizing that teachers in different subjects may require different technology applications, and 5) it should offer a range of delivery methods such as workshops, online support, coaching, and virtual communities. He also suggests that technology should not just be used as a means of transmitting knowledge but instead should stimulate inquiry, perspective-taking, and meaning making.

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