Lesson 2: Evolution of CALL

Introduction

The categorization of Computer-Assisted Language Learning (CALL) into three distinct phases: **Behaviouristic**, **Communicative**, and **Integrative,** proposed by **Mark Warschauer** and colleagues in the late 1990s, has profoundly influenced the trajectory of language education technology. By synthesizing pedagogical theories, technological advancements, and methodological critiques, this framework provided a foundational lens for analysing the evolution of CALL from its behaviourist roots to its socio-cognitive future.

1. Behaviouristic CALL

Behaviouristic CALL emerged as a transformative approach rooted in mid-20th-century behaviourist psychology. Conceived in the 1950s and implemented through the 1960s and 1970s, this paradigm utilized repetitive language drills and positioned computers as mechanical tutors capable of delivering consistent, non-judgmental instruction. Grounded in the principles of structural linguistics and audiolingual methodology, Behaviouristic CALL laid the groundwork for subsequent innovations in language learning technology.

1.1. Theoretical Foundations of Behaviouristic CALL

Behaviouristic CALL derived its core principles from **behaviourist learning theory**, which dominated psychological and educational discourse in the mid-20th century. Pioneered by figures such as Thorndike (1913), Pavlov (1927), and Skinner (1974), behaviourism posited that learning resulted from external stimuli, habit formation, and reinforcement. In language education, this translated to an emphasis on **drill-and-practice** exercises designed to instil grammatical structures and vocabulary through repetition. Learners were conditioned to produce correct linguistic forms via immediate feedback, with errors corrected mechanically to reinforce desired behaviours.

This approach aligned closely with **structural linguistics**, which treated language as a system of discrete elements (phonemes, morphemes, syntax) to be mastered sequentially. The **audiolingual** method, popularized in the 1950s, further reinforced this paradigm by prioritizing mimicry, memorization, and pattern drills over communicative competence. Behaviouristic CALL thus emerged as a natural extension of these theories, **leveraging technology to automate and scale repetitive practice.**

1.2. Early Implementations

The technological limitations of the 1950s and 1960s necessitated reliance on **mainframe computers**, which were large, centralized machines accessible via terminals. These systems enabled the development of early CALL programs, though their high cost and complexity restricted widespread adoption. The **PLATO** (Programmed Logic for Automatic Teaching Operations) system exemplified this era's innovations.

PLATO's software suite included vocabulary drills, grammar exercises, and translation tests, all structured to deliver challenges and immediate feedback. For instance, students might encounter a series of fill-in-the-blank sentences requiring correct verb conjugations, with the system highlighting errors and providing explanations. This design mirrored behaviourist principles by breaking language into manageable components and reinforcing mastery through repetition.

By the 1970s, the advent of **personal computers (PCs)** allowed educators to adapt Behaviouristic CALL programs for classroom use. However, the pedagogical framework remained unchanged: software continued to emphasize accuracy over fluency, and the computer's role as a "tutor" persisted.

A typical lesson might present learners with:

1. **Grammatical explanations**: Brief tutorials on rules (e.g., verb tenses).
2. **Pattern drills**: Substitution drills requiring learners to replace words in a sentence while maintaining structure.
3. **Translation exercises**: Direct translations between the target language and the learner's L1.

These activities prioritized **form over function**, with success measured by the number of correct responses rather than creative language use. The computer's ability to provide instant, unbiased feedback was hailed as a breakthrough, enabling self-paced learning and reducing reliance on human instructors.

1.3. Limitations of the Behaviourist Paradigm

By the late 1970s, Behaviouristic CALL faced mounting criticism. Critics drill-and-practice as **"drill-and-kill"**, arguing that it reduced language learning to rote memorization and stifled communicative competence. The cognitive revolution in psychology further undermined behaviourism by emphasizing internal mental processes, such as problem-solving and hypothesis-testing, which were neglected in rigid, scripted exercises.

In 2003, Bax argued that early CALL was "restricted" not only by technology but also by pedagogical dogmatism, as designers imposed narrow constraints on learner agency and creativity. This critique highlighted the tension between behaviourism's mechanistic routines and the evolving understanding of language as a dynamic, socially-constructed system.

While later paradigms (Communicative and Integrative CALL) shifted focus to authentic communication and multimedia, traces of Behaviouristic CALL persist in modern tools. **Spaced repetition systems (SRS)** like Anki and Duolingo's grammar drills inherit the behaviourist emphasis on mastery and reinforcement. However, these tools often integrate cognitive and sociocultural elements, such as contextual sentences and peer interaction, reflecting a hybridized approach.

2. Communicative CALL:

The emergence of Communicative CALL in the late 1970s and early 1980s marked a pivotal departure from the rigid, behaviourist-driven methodologies of its predecessor. As critiques of structural linguistics and audiolingualism gained momentum, educators and technologists sought to align language instruction with emerging **cognitive theories** and the **communicative competence framework**. This paradigm shift coincided with the propagation of personal computers, which offered unprecedented opportunities for individualized and collaborative learning. While Communicative CALL introduced innovative tools like **text reconstruction programs** and simulation activities.

2.1. Theoretical Foundations of Communicative CALL

The decline of **Behaviouristic CALL** was precipitated by growing dissatisfaction with its reductionist view of language as a set of discrete, mechanically reinforced components. By the late 1970s, Chomsky's (1965) critique of Skinnerian behaviourism had altered applied linguistics, shifting focus toward **innate cognitive processes** and the creative construction of meaning. Communicative Language Teaching (CLT), emphasizing authentic interaction and functional language use, became the dominant pedagogical framework. Proponents of Communicative CALL argued that technology should facilitate **meaning-focused tasks** rather than repetitive drills, enabling learners to "generate original utterances" and engage in problem-solving activities.

This shift aligned with **cognitive psychology**, which posited learning as an active process of hypothesis-testing and discovery. Warschauer and Healey (1998) framed Communicative CALL as a bridge between cognitive theories and technological tools, asserting that software should promote "expression and development" rather than rote memorization. The computer's role evolved from a mechanical tutor to a **stimulus for interaction**, whether between learners, with the software, or through simulated real-world scenarios.

2.2.Technological Context: The Rise of Personal Computers

Early software leveraged text-based interfaces to create interactive environments where learners could manipulate language elements dynamically. This technological shift also facilitated **pair and group work**, as seen in simulation activities where learners collaborated to solve narrative-based puzzles or role-play scenarios. The computer became a "silent participant" in these interactions, providing scaffolding without dictating the flow of communication.

A hallmark of Communicative CALL was the development of **text manipulation software**, which required learners to reconstruct jumbled texts by inferring grammatical rules and contextual meaning. Programs like *Storyboard* and *Text Tanglers* presented scrambled sentences or paragraphs, challenging students to reorder them into coherent passages. Hewer (1997) identified multiple variants of these activities, including gap-filling, word replacement, and paragraph sequencing, all designed to promote **implicit grammar acquisition**.

Simulation software emerged as another key innovation, immersing learners in interactive scenarios requiring negotiation and decision-making. Programs like *SimCity* (adapted for language learning) tasked students with resolving fictional crises—such as planning a town's infrastructure—through collaborative dialogue in the target language.

2.3. Critical Evaluations and Limitations

By the late 1980s, scholars questioned whether Communicative CALL had fulfilled its theoretical promise. Kenning and Kenning (1990) argued that most software remained peripheral to core language instruction, contributing to "marginal rather than central elements" of learning. Critics observed that many programs merely digitized traditional exercises—such as multiple-choice quizzes—without leveraging the computer's interactive potential.

Bax (2003) found slight alignment between CALL activities and CLT principles like **authentic interaction** or **negotiation of meaning**. For example, most simulations restricted learners to predefined pathways, stifling spontaneous communication. He concluded that the term "Communicative CALL" reflected aspirational branding rather than empirical reality, proposing **"Restricted CALL"** as a more accurate descriptor.

While superseded by Integrative CALL, Communicative CALL's emphasis on collaboration persists in contemporary tools like **AI-driven call simulators** and **virtual role-play platforms**. Second Nature's (2024) simulations, for example, train call centre agents through dynamic dialogues with AI partners, reflecting the communicative focus on real-time interaction and problem-solving. Similarly, mobile-assisted language learning (MALL) apps incorporate gamified simulations that reward creative language use over rote repetition. Also, platforms like Duolingo and Memrise use algorithms to personalize sentence-scrambling tasks, ensuring they align with learners' proficiency levels and interests.

3. Integrative CALL

The 1990s witnessed a paradigm shift toward **socio-cognitive theories**, which emphasized language acquisition through social interaction and authentic discourse. Warschauer (1996) acknowledged that Communicative CALL's focus on individual cognition neglected the communal dimensions of learning, prompting calls for **task-based** and **content-based** approaches. **Integrative CALL** emerged as a response, leveraging multimedia and the internet to connect learners with global audiences and real-world contexts.

3.1. Theoretical Foundations of Integrative CALL

Warschauer and Healey (1998) positioned Integrative CALL as a response to socio-cognitive theories, which prioritize **collaborative knowledge construction** over individual cognitive processes. This shift aligned with Vygotsky's (1978) concept of the Zone of Proximal Development, where learning occurs through socially mediated activities. For example, web-based collaborative

projects allow learners to negotiate meaning with global peers, bridging classroom practice and real-world communication.

Integrative CALL's theoretical framework emphasizes **multimodal learning**, where text, audio, video, and interactivity converge to replicate authentic language use. Hypermedia environments, such as interactive eBooks or multimedia CD-ROMs, enable learners to navigate non-linear content, fostering autonomy and contextualized skill integration. For instance, the *Living Books* series integrated animations and voiceovers with text, allowing students to explore vocabulary and syntax through narrative immersion.

3.2. Technological Basis: The Multimedia Networked Computer

While Behaviouristic CALL relied on mainframes and Communicative CALL on personal computers (PCs), Integrative CALL is defined by **multimedia networked computers**. These systems combine local processing power with internet connectivity, enabling access to global resources and real-time collaboration. For example, students in a German class might use a platform like *Moodle* to co-author a blog with peers in Berlin, integrating research, writing, and peer feedback into a single task.

1. **Multimedia Integration**: Tools like *Adobe Captivate* allow educators to design lessons blending video, interactive quizzes, and branching scenarios. A Spanish module might include a virtual tour of Madrid with embedded grammar exercises, contextualizing subjunctive verb forms within cultural narratives.
2. **Computer-Mediated Communication (CMC)**: Synchronous tools (e.g., Zoom chats) and asynchronous platforms (e.g., discussion forums) facilitate cross-cultural exchanges. In one case study, ESL students in Mexico negotiated trade policies with counterparts in Canada via a simulated UN forum, practicing persuasive writing and diplomatic register.
3. **Intelligent CALL**: AI-driven chatbots like *Replika* provide conversational practice, adapting responses to learners' proficiency levels. These tools simulate authentic dialogue while offering grammatical feedback, bridging behaviourist repetition with communicative fluency.

3.3. Pedagogical Applications and Skill Integration

a) **Integrative CALL rejects the skill segregation of earlier paradigms.** A single project might involve:

- **Listening** to a podcast on climate change,
- **Reading** scientific articles,
- **Writing** a collaborative report, and
- **Speaking** during a video conference debate.

b) **Authentic Learning Environments:** Hypermedia resources like the *BBC Languages* portal immerse learners in target cultures through news clips, recipes, and interactive games. These environments prioritize **content-based instruction**, where language acquisition occurs incidentally through engagement with meaningful material.

c) **Socio-Economic Drivers of Integrative CALL:** The late 20th century's shift to information-based economies necessitated **digital literacy** and cross-cultural communication skills. Companies like Siemens and Toyota adopted multilingual CMC platforms for employee training, emphasizing technical vocabulary and collaborative problem-solving in lingua francas like English or Mandarin. This demand reshaped educational priorities, with governments funding initiatives like the EU's *Digital Education Action Plan* to integrate CALL into national curricula.
d) **The Decline of Teacher-Centred Instruction:** As noted by Warschauer and Healey (1998), teachers transitioned from "sages on stages" to "guides on the side,". In South Korea's *SMART Education* initiative, instructors use analytics from platforms like *ClassKara* to identify student weaknesses and recommend personalized multimedia exercises. This role mirrors broader societal shifts toward **lifelong learning**, where individuals must continuously adapt to technological change.

3.4. Implementation Challenges

a) While Integrative CALL thrives in "developed countries," its reliance on high-speed internet and modern hardware aggravates global inequities. A 2024 UNESCO report found that 60% of Sub-Saharan African schools lack reliable broadband, rendering web-based tasks impractical. Even in wealthier regions, socioeconomic divides persist; students in underfunded U.S. districts often rely on outdated lab computers, limiting their ability to engage with resource-intensive simulations.
b) Critics argue that some "integrative" tools merely digitize traditional exercises. For instance, Duolingo's gamified drills prioritize vocabulary accumulation over authentic communication, contradicting the paradigm's socio-cognitive aims. Similarly, MOOC platforms like Coursera often reduce interaction to forum posts, lacking the nuanced dialogue of face-to-face collaboration.

3.5. Future Directions and Innovations

a) Emerging tools like **neural machine translation** (NMT) and **sentiment analysis** are personalizing language learning. The app *ELSA Speak* uses AI to analyse pronunciation errors and generate tailored exercises, while *GrammarlyGO* offers genre-specific writing feedback. Future systems may integrate virtual reality (VR) to simulate immersive environments, such as practicing business negotiations in a virtual Shanghai boardroom.
b) Smartphones have expanded Integrative CALL's reach, enabling "anytime, anywhere" learning. In refugee camps across Jordan, apps like *LearnSyria* deliver Arabic lessons via SMS, combining audio clips and interactive quizzes to accommodate low-bandwidth users. However, challenges remain in designing MALL content that balances engagement with pedagogical depth.

II. Critiques and Theoretical Challenges of CALL Phases

Bax (2003) identified inconsistencies in Warschauer's timeline, noting that phases were alternately described as historical eras, paradigms, or pedagogical perspectives. For instance, **Communicative CALL** was dated to the 1980s–1990s in some works but linked to the late 1970s in others, undermining its coherence as a developmental stage.

Critics also questioned the model's **technological determinism**, arguing that it overstated the causal role of innovations like multimedia while underplaying socio-cultural factors. Warschauer himself cautioned against "hard determinism," advocating instead for a "soft" view where technology enables, rather than dictates, pedagogical outcomes.

Empirical studies revealed disparities between Warschauer's idealized phases and actual classroom practices. During the purported **Communicative CALL** era, many programs merely digitized traditional exercises (e.g., multiple-choice quizzes) rather than fostering genuine interaction. Similarly, early "integrative" tools often prioritized technical novelty over pedagogical depth, as seen in CD-ROMs that combined media formats without enabling authentic discourse.

Bax (2003) extended Warschauer's work by proposing **CALL normalization**, where technology becomes seamlessly integrated into language teaching, akin to pens or textbooks. This concept, influenced by the socio-cognitive focus of Integrative CALL urged educators to prioritize pedagogical goals over technological trends.

III. CALL research: Trends and issues

The field of Computer-Assisted Language Learning (CALL) has undergone significant transformations since its inception, driven by technological advancements, pedagogical innovations, and evolving theoretical frameworks. Research in CALL has not only shaped its trajectory but also cemented its credibility within applied linguistics and educational technology. From early comparative studies to contemporary mixed-methods approaches, CALL research has grappled with methodological diversity, interdisciplinary tensions, and the imperative to address real-world language learning needs.

1. Historical Evolution of CALL Research

1.1. Early Comparative Studies and Their Limitations

In its nascent stages (1980s–1990s), CALL research predominantly sought to validate the efficacy of computer-assisted instruction over traditional methods. Influenced by behaviourist paradigms, studies often compared outcomes between CALL-based drills and classroom teaching. However, meta-analyses by Dunkel (1991) and Pederson (1987) revealed **"no significant difference"** in learning outcomes, undermining the rationale for such comparisons. These findings prompted a paradigm shift toward investigating how specific CALL features rather than the technology itself—enhanced

learning. For example, Grgurović & Hegelheimer (2007) compared the effectiveness of captions versus transcripts in video lessons, illustrating the field's pivot to nuanced, component-focused inquiries.

1.2. The Rise of Multidisciplinary Frameworks

Early CALL research operated within siloed disciplines, but the 1990s saw the integration of insights from **educational psychology**, **linguistics**, and **computer science**. Miech et al. (1996) conceptualized CALL as a confluence of three "streams," where advancements in one domain (e.g., hypermedia in computer science) necessitated alignment with pedagogical theories (e.g., Vygotskian scaffolding) and linguistic principles (e.g., communicative competence). This interdisciplinary approach enabled innovations like captioning in video-based lessons, which improved comprehension by 40% in controlled studies.

1.3. Methodological Shifts: From Quantitative Dominance to Mixed Methods

1.3.1. Quantitative Foundations and Their Critiques

Early CALL studies overwhelmingly employed **quantitative methodologies**, utilizing surveys, quasi-experiments, and pre/post-test designs to measure lexical retention or grammatical accuracy. While these methods provided measurable outcomes, critics argued they oversimplified the complexity of language acquisition. For instance, Kenning & Kenning (1990) noted that quantitative studies often ignored contextual factors like learner motivation or socio-cultural dynamics.

1.3.2. Qualitative and Mixed-Methods Renaissance

The 2000s witnessed a surge in **qualitative research**, particularly in computer-mediated communication (CMC). Ethnographic case studies and discourse analyses explored how learners negotiated meaning in online forums or virtual exchanges, revealing the role of identity construction and peer feedback in language development. Mixed-methods approaches gained prominence by combining quantitative metrics (e.g., error rates) with qualitative insights (e.g., learner diaries), offering a holistic view of CALL's impact. Egbert & Petrie's (2005) seminal volume catalogued these methodologies, advocating for rigor in data triangulation and theoretical grounding.

2. Theoretical Frameworks: Diversity and Fragmentation

2.1.Interactionist vs. Socio-Cultural Lenses

CALL research has drawn from divergent theoretical traditions, complicating the establishment of unified norms. Fernández-García & Martínez-Arbelaiz (2002) applied **interactionist SLA theory** to analyse negotiation of meaning in chat rooms, while Darhower (2002) employed **socio-cultural theory** to examine power dynamics in online collaborations. This pluralism, while enriching, has led to fragmented findings. Chapelle (2005) argued that interactionist frameworks risked reducing language to transactional exchanges, whereas socio-cultural approaches sometimes overemphasized context at the expense of linguistic form.

2.2. Technocentrism and Theoretical Vagueness

Bax (2003) and Huh & Hu (2005) critiqued early CALL studies for **technocentrism,** prioritizing technological novelty over pedagogical soundness. For example, multimedia CD-ROMs of the 1990s often featured flashy animations but lacked alignment with SLA principles. Warschauer (1996) countered that CALL's interdisciplinary nature necessitated flexibility, advocating for "theoretical pluralism" to accommodate diverse learning contexts.

3. Current Research Hotspots and Trends

3.1. Dominant Themes: CMC, AI, and Gamification

Scientometric analyses reveal that **computer-mediated communication (CMC)**, **adaptive learning systems**, and **gamification** dominate contemporary CALL research. Studies on CMC explore how platforms like Zoom or Discord facilitate intercultural exchanges, while AI-driven tools (e.g., chatbots) personalize feedback through natural language processing. Gamified apps like Duolingo leverage behavioural psychology to enhance engagement, though critics argue they perpetuate behaviourist repetition under a communicative veneer.

3.2. Emerging Frontiers: VR and Inclusive Design

Immersive technologies like **virtual reality (VR)** are gaining traction, with studies examining their efficacy in simulating authentic environments (e.g., virtual marketplaces for language practice). Concurrently, researchers are addressing **inclusivity gaps**, designing tools for atypical learners (e.g., dyslexic students) and marginalized linguistic communities. The 2025 CALS conference highlights this trend, emphasizing the need to redefine "typical" speakers in multilingual, migratory societies.