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Computer Assisted Language Learning: Theory and Practice

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«امروزه کتاب‌خوانی و علم‌آموزی، نه تنها یک وظیفه‌ی ملی، که یک واجب دینی است.»^۱

در عصر حاضر یکی از شاخصه‌های ارزیابی رشد، توسعه و پیشرفت فرهنگی هر کشوری میزان تولید کتاب، مطالعه و کتاب‌خوانی مردم آن مرز و بوم است. ایران اسلامی نیز از دیرباز تاکنون با داشتن تمدنی چندهزارساله و مراکز متعدد علمی، فرهنگی، کتابخانه‌های معتبر، علما و دانشمندان بزرگ با آثار ارزشمند تاریخی، سرآمد دولت‌ها و ملت‌های دیگر بوده و در عرصه‌ی فرهنگ و تمدن جهانی به‌سان خورشیدی تابناک همچنان می‌درخشد و با فرزندان نیک‌نهاد خویش هنرنمایی می‌کند. چه کسی است که در دنیا با دانشمندان فرزانه و نام‌آور ایرانی همچون ابوعلی سینا، ابوریحان بیرونی، فارابی، خوارزمی و ... همچنین شاعران برجسته‌ای نظیر فردوسی، سعدی، مولوی، حافظ و ... آشنا نباشد و در مقابل عظمت آنها سر تعظیم فرود نیاورد. تمامی این افتخارات ارزشمند، برگرفته از میزان عشق و علاقه فراوان ملت ما به فراگیری علم و دانش از طریق خواندن و مطالعه منابع و کتاب‌های گوناگون است. به شکرانه‌ی الهی، تاریخ و گذشته ما، همیشه درخشان و پربار است. ولی اکنون در این زمینه در چه جایگاهی قرار داریم؟ آمار و ارقام ارائه‌شده از سوی مجامع و سازمان‌های فرهنگی در مورد سرانه‌ی مطالعه‌ی هر ایرانی، برایمان چندان امیدوارکننده نمی‌باشد.

کتاب، دروازه‌ای به سوی گستره‌ی دانش و معرفت است و کتاب خوب، یکی از بهترین ابزارهای کمال بشری است. همه‌ی دستاوردهای بشر در سراسر عمر جهان، تا آنجا که قابل کتابت بوده است، در میان دست‌نوشته‌هایی است که انسان‌ها پدید آورده و می‌آورند. در این مجموعه‌ی بی‌نظیر، تعالیم الهی، درس‌های پیامبران به بشر، و همچنین علوم مختلفی است که سعادت بشر بدون آگاهی از آنها امکان‌پذیر نیست. کسی که با دنیای زیبا و زندگی‌بخش کتاب ارتباط ندارد بی‌شک از مهم‌ترین دستاورد انسانی و نیز از بیشترین معارف الهی و بشری محروم است. با این دیدگاه، به‌روشنی می‌توان ارزش و مفهوم رمزی عمیق در این حقیقت تاریخی را دریافت که اولین خطاب خداوند متعال به پیامبر گرامی اسلام (ص) این است که «بخوان!» و در اولین

۱. پیام مقام معظم رهبری به مناسبت آغاز هفته کتاب ۷۲/۱۰/۴

سوره‌ای که بر آن فرستاده‌ی عظیم‌الشان خداوند، فرود آمده، نام «قلم» به تجلیل یاد شده‌است: «اقْرَأْ وَ رَبُّكَ الْأَكْرَمُ. الَّذِي عَلَّمَ بِالْقَلَمِ» در اهمیت عنصر کتاب برای تکامل جامعه‌ی انسانی، همین بس که تمامی ادیان آسمانی و رجال بزرگ تاریخ بشری، از طریق کتاب جاودانه مانده‌اند.

دانشگاه پیام‌نور با گستره‌ی جغرافیایی ایران‌شمول خود با هدف آموزش برای همه، همه‌جا و همه‌وقت، به‌عنوان دانشگاهی کتاب‌محور در نظام آموزش عالی کشورمان، افتخار دارد جایگاه اندیشه‌سازی و خردورزی بخش عظیمی از جوانان جویای علم این مرز و بوم باشد. تلاش فراوانی در ایام طولانی فعالیت این دانشگاه انجام پذیرفته تا با بهره‌گیری از تجربه‌های گرانقدر استادان و صاحب‌نظران برجسته کشورمان، کتاب‌ها و منابع آموزشی درسی شاخص و خودآموز تولید شود. در آینده هم، این مهم با هدف ارتقای سطح علمی، روزآمدی و توجه بیشتر به نیازهای مخاطبان دانشگاه پیام‌نور با جدیت ادامه خواهد داشت. به‌طور قطع استفاده از نظرات استادان، صاحب‌نظران و دانشجویان محترم، ما را در انجام این وظیفه‌ی مهم و خطیر یاری‌رسان خواهد بود. پیشاپیش از تمامی عزیزانی که با نقد، تصحیح و پیشنهادهای خود ما را در انجام این وظیفه‌ی خطیر یاری می‌رسانند، سپاسگزاری می‌نماییم. لازم است از تمامی اندیشمندانی که تاکنون دانشگاه پیام‌نور را منزلگاه اندیشه‌سازی خود دانسته و ما را در تولید کتاب و محتوای آموزشی درسی یاری نموده‌اند، صمیمانه قدردانی گردد. موفقیت و بهروزی تمامی دانشجویان و دانش‌پژوهان عزیز آرزوی همیشگی ما است.

دانشگاه پیام‌نور

Table of Contents

Foreword	V
List of Abbreviations	VI
Section One: Approaches	1
Chapter One: Technology: A Retrospect	3
Chapter Two: Technology and Language Learning	13
Chapter Three: Computer Assisted Language Learning	26
Chapter Four: CALL and Complex System Theory	48
Chapter Five: Sociocultural Theory of Language Learning	74
Chapter Six: Constructivism and CALL: Revisited	86
Chapter Seven: Web 1.0, Web 2.0, and Web 3.0	96
Chapter Eight: Augmented Reality and Virtual Reality in CALL	109
Chapter Nine: Moodle and Language Learning /Teaching	123
Chapter Ten: Materials Development in CALL	133
Chapter Eleven: Teacher Education in CALL	146
Chapter Twelve: Literacy in CALL	165
Section Two: Technology and Language Skills	183
Chapter Thirteen: Reading in CALL	185
Chapter Fourteen: Writing in CALL	194
Chapter Fifteen: Listening in CALL	201
Chapter Sixteen: Speaking in CALL	208
APPENDIX: Sites for Teachers and Students	217

To My Sons,

Arshia and Armin

Foreword

Computer Assisted Language Learning (CALL) is an academic multidisciplinary and interdisciplinary field which connects language learning and teaching to computer technology. Generally speaking, the role of CALL is to make insights drawn from areas of language, learning, teaching, and technology relevant to decision-making in language learning pedagogy. In this sense, CALL mediates between theory and practice.

This book *Computer Assisted Language Learning: Theory and Practice* is a work covering key issues in technology and foreign language learning and teaching. The book is divided into two sections: Theory and practice. The section on theory includes twelve chapters with topics commonly referred to in the literature of CALL, and the section on practice has four chapters focusing on using technology for actual practice in the four language skills (Listening, Speaking, Reading, and Writing). Attempts have been made to identify various technologies and software programs that might be regularly used in the classroom setting for all EFL students to improve their learning. Each chapter provides the reader with an overview of one of the areas of the field.

As a teacher of CALL, I have been teaching CALL courses since 2014 to MA and PhD students in computer assisted language learning courses. The book is the result of my years of experience in the CALL courses. Therefore, the book is intended for a diverse audience in

applied linguistics, but is firmly directed to MA students in TEFL. The book might also be useful for teachers, graduate students, researchers, and practitioners to familiarize themselves with the field.

I take responsibility for the contents of the book, including its flaws.

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List of Abbreviations

ALLP: Athena Language Learning Project

ALM: Audiolingual Method

API: Application Programming Interface

AR: Augmented Reality

BASE: British Academic Spoken English Corpus

CAI: Computer Assisted Instruction

CALL: Computer Assisted Language Learning

CALT: Computer Assisted Language Teaching

CALT: Computer Assisted Language Testing

CBLT: Computer-Based Language Teaching

CELL: Computer-Enhanced Language Learning

CERN: The European Organization for Nuclear Research

CMC: Computer Mediated Communication

CMS: Course Management Systems

COCA: Corpus of Contemporary American English

CSCL: Computer Supported Collaborative Learning

CTML: Cognitive Theory of Multimedia Learning

EFL: English as a Foreign Language

ESL: English as a Second Language

GTM: Grammar Translation Method

ICT: Information Communication Technology

IRC: Internet Relay Chat

IT: Information Technology

ITS: Intelligent Tutoring System
LINDSEI: Louvain International Database of Spoken English Interlanguage
LMS: Learning Management Systems
MALL: Mobile Assisted Language Learning
MICASE: Michigan Corpus of Academic Spoken English
MOODLE: Multiple Object Oriented Dynamic Learning Environment
NELL: Network Enhanced Language Learning
NBLL: Network-Based Language Learning
NBLT: Network Based Language Teaching
NLP: Natural Language Processing
OLC: Online Learning Community
PC: Personal Computer
PLATO: Programmed Logic for Automatic Teaching Operations
PL: Programmed Learning
RQM: Retrodictive Qualitative Modelling
SCT: Sociocultural Theory
SLA: Second Language Acquisition
SLAR: Second Language Acquisition Research
SoLET: Science of Learning and Educational Technology
TELL: Technology Enhanced Language Learning
TPACK: Technological Practical, and Content Knowledge
TTS: Text to Speech
UNIX: UNiversal Interactive eXecutive
VoIP: Voice over Internet Protocol
VLE: Virtual Learning Environment
VR: Virtual Reality
WWW: World Wide Web
ZPD: Zone of Proximal Distance

Section One: Approaches

Chapter One

Technology: A Retrospect

Introduction

The application of technology in education in general and language teaching and learning in particular is not a recent endeavour in pedagogy. The term *technology*, as a key concept, is an umbrella term that covers a range of technological assets utilized by human beings throughout history to control their environment. Therefore, technology covers an array of old, new, and emerging technologies used to help learning and teaching. In this sense, technology both brings challenges and presents exciting opportunities to enhance learning and teaching. It is challenging since it demands creativity and innovation on the part of curriculum participants (EFL teachers, learners, materials developers, syllabus designers, and policy makers). In the present book, technology is referred to as modern “computer technologies” in the context of language learning and teaching. Later we discuss what “computer technology” actually implies and the scope of technologies that might be called computerized, from Pod/Vodcasting to augmented/virtual learning via smart phones, for instance.

A Brief History

Technology, in some way or another, has been with us for centuries. To some people, nowadays, technology is reminiscent of language labs, tape recorders, radio, television, computer, and the Internet. However, this is not a rich picture of technology in education.

4 Computer Assisted Language Learning: Theory and Practice

Technology in education started with writing. Historically speaking, the origin of technology use for education dates back to thousands of years. Books are common place objects we see everywhere today; in the past it was not! In a particular point of time, books were considered as the height of technology, with the Gutenberg printing press. In fact, the heyday of books in education continued until the advent of computers in the modern time. It might be amazing to hear that technology utilization might have preceded the emergence of books as well!

As mentioned earlier, the beginning of technology in learning was with writing. Cuneiform is the wedge-shaped characters used in the ancient writing systems of Mesopotamia, Persia, and Ugarit, surviving mainly on clay tablets. They used a stylus for their purpose. In fact, a stylus was a writing utensil used by ancient people for marking or shaping on clay and wax. As recorded in the history, the ancient Mesopotamians firstly used styluses in order to write in cuneiform. The styluses were commonly made of reeds and had a slightly-curved section. Egyptians made styluses in different materials: reeds that grew on the sides of the Tigris and Euphrates rivers. In addition, they used bone and metal styluses in their writings. Cuneiform was entirely based on the "wedge-shaped" mark that the end of a cut reed made when pushed into a clay tablet. The writings were made on clay tablets and were left to dry in the sun until they became hard before being incised by the stylus. Later styluses were utilized in the Western Europe until the late Middle Ages. To meet the requirements of learning and education, the stylus was then replaced by a writing slate (see <https://cuneiform.neocities.org/CWT/CWT.html> for further information on Cuneiform and stylus forms).

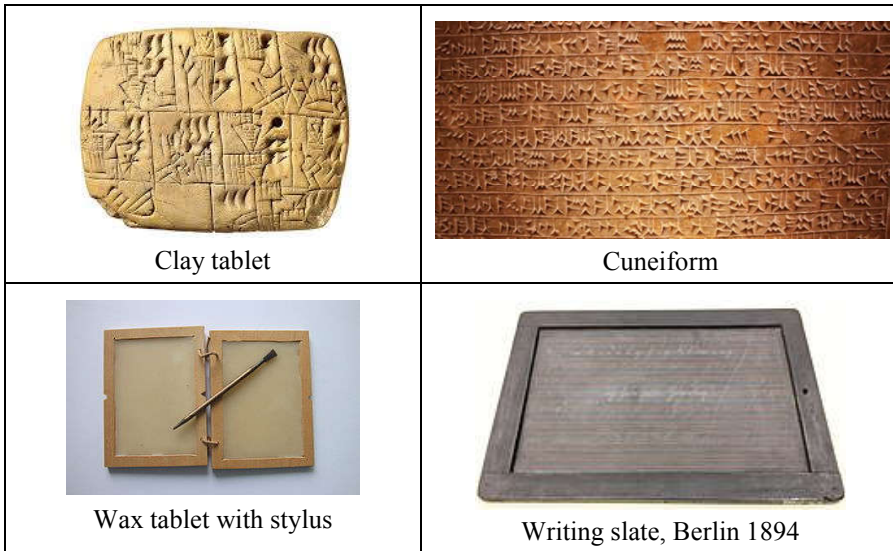


Figure 1.1. Cuneiform and stylus forms

As it can be understood from the previous historical records, the utilization of clay tablets and styluses was the technology of the ancient times for writing. It was before “books” as we know them today were produced. From the mid-14th century, paper mills working with water power produced large and cheap quantities of paper and the wax tablet. As a result, the stylus disappeared completely from daily life. The next technology that appeared was the Gutenberg printing press. As mentioned before, books are commonplace today; however, in the past, the appearance of paper and then book production were the heyday of technology. If we accept that the advent of computers is a radical shift from books, the printing press and appearance of paper was a technology shift from the clay and wax slates and stylus technology in writing. This new technology paved the way for the noble classes of different societies to learn Latin that was the language of politics, philosophy, religion, and other scholarly fields until the end of the 16th century.

Gutenberg's Printing Press

It would not be exaggerating to claim that the invention of the Gutenberg's printing press was as paramount as the emergence of the Internet. Gutenberg was not actually the first to recognize the benefits of printing press. Chinese had probably constructed woodblock printing by around 600 AD. The appearance of the Gutenberg's machine accelerated developments in many aspects in the world in general and western life in particular. It facilitated the fast spread of knowledge, especially literature, and increased the literacy rate among citizens. Not only did the new invention influence education and literacy but also it greatly impacted religious ideas. For instance, prior to the invention of the Gutenberg's printing press, Buddhist monks had access to hand-carved blocks in Latin which uneducated people could not understand. In fact, they would depend on what they heard and saw in their small villages. People were preached to by the Catholic Church that was regarded as the only source of education. With Gutenberg's printing technology, literacy spread and developed and all these changed.

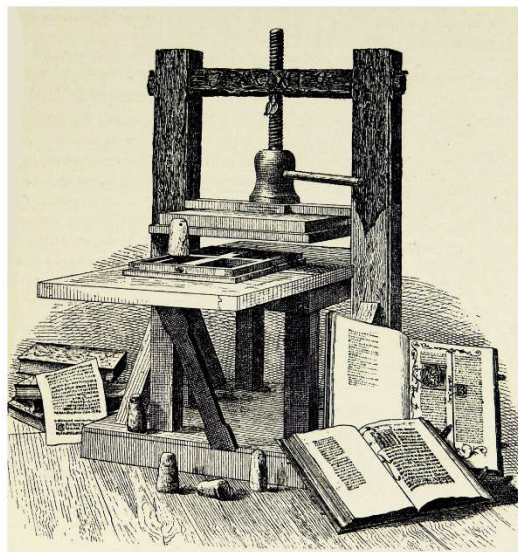


Figure 1.2. Gutenberg's first printing press

Gutenberg was working on some prototypes of the printing machine in 1440. In fact, he did not instantly make a new printing press but he utilized some older technologies in order to build his own press: He constructed the screw press all by himself and moulded typesetting. Gutenberg improved his printing press and in 1455 printed copies of his infamous Gutenberg Bible: Three volumes of text that was in Latin and included 42 lines of characters per page with colourful illustrations. The printing of the Bible by Gutenberg was a step forward for mankind and a quick and sudden move for technology in the modern world. The Gutenberg technology is very influential for the type of technology that was accessible at that time in history. Now owing to the new technology, new ideas and knowledge could be shared among more people rapidly and education continued to bloom in the world afterwards. The utilization of the printing press in science was not as fast as it was in religion since religion was prominent in everyday life of people. In fact, the effect of printing on science was not observed until the seventeenth century.



Figure 1.3. Illustrated page from the Gutenberg Bible, also known as the 42-Line Bible produced around 1453-1456

Magic Lantern and Sandbox

Actually introduced in the 1600s, the Magic Lantern (a predecessor to today's projectors) continued the idea of the importance of images in learning, but now with the ability to have images move, it provides a way to allow the teacher to easily change the images. Now, instead of the teacher relying on each student being able to find the correct image in their textbook, they can instruct their students all at once by projecting an image onto the screen. This also provides the teachers with the opportunity to do more with storytelling, especially an adept teacher who could turn the Magic Lantern into a moving image box.

Language Labs

Technology evolves and language learning and teaching takes advantage of it to achieve better results. In the 1950s, language teaching witnessed a pendulum change from pure grammar-based instruction (like the GTM) to communication-based methods where listening and speaking were emphasized. Now the older technology could not be used to achieve the above mentioned objectives. To get mastery over speaking, students were required to be exposed to authentic language they had never heard in their classes. The introduction of the language lab began this fundamental shift that continues even today.

In the 1950s, the price of personal audio technology made the language lab a practical chance for language learners primarily in the United States. Prior to language labs, vinyl records were played for the whole students in the class and there was only one record player and the sound was not always accessible to large classes. Later, with the appearance of personal headphones and also the accessibility and cost-effectiveness of technology, many universities and high schools took advantage of language labs for language learners. Now, students could practice their own material at their own pace, instead of the entire class doing the same activity at the same time. Students also finally had access to native voices, giving them a more authentic

experience. This shows a great leap towards the personalized learning that is now prominent in classrooms.



Figure 1.4. Language lab

Early 20th Century Technologies for learning

In the beginning of the 20th century, some then dominant technologies including audio and visual materials were used together with written texts; consequently, the application of current technology was driven by language teaching methods of the time. Although in the Grammar-Translation Method, originally used to teach Latin and Greek, technology had no contribution to language learning and teaching, alternative methods such as the Berlitz Method, the Natural Method, the Direct Method emphasized the ability to speak. These methods advocated extensive oral practice and frequent phonetics/pronunciation exercises while deemphasizing the teaching of grammar. They embraced audiovisual technologies that brought the language as spoken by native speakers to the classroom and provided oral and aural practice. Audio formats used in classrooms evolved from cylinder recordings to phonograph records (Clarke, 1999; Stocker, 1921), to practice pronunciation and intonation, as well as listening comprehension. Later, radio was a conduit for distance language learning for students in school and for the general public. Photographs and slides, which were commonly used for language instruction, were joined by films as media to bring culture and language to life in the classroom (Bernard 1937, cited in Chapelle & Sauro, 2017).

10 Computer Assisted Language Learning: Theory and Practice

The influence of B. F. Skinner's behaviorist learning theory and of the Audiolingual Method (ALM), started in the 1950s, (Richards & Rodgers, 2001). It emphasized repetition, and naturally a surge took place in the use of language laboratories. In the 1950s to the 1970s majority of schools and universities had a reel-to-reel audiotape language laboratory classroom to provide the learners with access to native-speaker voices and drills to internalize sentence patterns and to promote automaticity. With the decline of the ALM, the use of language labs in the foreign language curriculum decreased noticeably.

In the late 1950s, mainframe computers with high computing power that was accessed via paper punch cards started to appear widely in/at universities and research institutes. Nevertheless, it was not until the late 1960s and early 1970s that computers had evolved enough to support multiple terminals that allowed interaction with the computer via keyboard. This opened the pathway to CALL which emphasizes the application of computers to practice various forms of language, particularly grammar and vocabulary: exercises could be self-paced and self-selected; immediate performance feedback could be provided; assessment of mastery could be done based on cumulative performance. Accordingly, the teacher could be liberated from correcting endless workbook assignments; and class time could be freed up so that the teacher could focus on communicative activities (Chapelle & Sauro, 2017).

Mainframes are powerful computers that are used for large information processing occupations. They are basically used by government institutions and big companies for tasks such as census, industry and consumer statistics, enterprise resource planning, and financial transaction processing.



Figure 1.5. Mainframe computers

The first mainframe computer was the Harvard Mark I which started in the 1930s. The machine was not ready for use until 1943. It weighed five tons, filled an entire room and cost about \$200,000 to build which is something like twenty-eight million in 2017 money. PLATO (Programmed Logic for Automatic Teaching Operations) was the first computer-assisted instruction project that started in 1960 running on the University of Illinois' computer. By the late 1970s, it supported several thousand graphics terminals distributed worldwide, running on nearly a dozen different networked mainframe computers. Many modern concepts in multi-user computing were originally developed on PLATO, including forums, message boards, online testing, e-mail, chat rooms, picture languages, instant messaging, remote screen sharing, and multiplayer video games.

PLATO functioned for four decades and offered coursework from elementary to tertiary levels to students, schools, and other universities. A range of subjects, including Latin and education, were introduced in the courses, and the system contained a number of characteristics that were helpful for pedagogy, including text graphics, contextual assessment of free-text answers, and feedback designed to respond to alternative answers.

