Computer Applications in Second Language Acquisition

Foundations for teaching, testing and research

Carol A. Chapelle

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For my parents

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Series editors' preface

Perhaps no single area of applied linguistics has seen such explosive growth over the past 15 years as computer-assisted instruction. Books and journal articles on the subject abound – indeed, new journals have appeared dedicated exclusively to it. Rapid developments in computer hardware and software are obviously a driving force, but so, too, is the increasing number of computer-literate people entering the field, whether as graduate students or language teachers.

Amidst all the excitement and innovation, however, a degree of healthy skepticism has survived in some quarters. Just how much of the work has produced genuine advances in language sciences? How much has really been a case of computer-buffs in search of a justification for their love of the technology, or worse, computer manufacturers in search of new markets for their products?

Carol Chapelle is a rare and valuable blend of enthusiast and skeptic. She is unquestionably one of the leading authorities on computer-assisted language instruction, and sees exceptional opportunities in computer-aided research for applied linguists. However, she is equally well known, and justifiably so, as an expert on second language acquisition, language teaching, and language testing, in each of which area she had published extensively before her work with computers in applied linguistics began, and in each of which she has continued to publish since. Her knowledge in those fields enables her to review research and practice involving the new technology fairly, but critically – to distinguish substantive contributions from commercial gimmickry. In particular, she regards research in second language acquisition as both a field in which computer technology can be of immense value, and as a valuable source of knowledge for researchers and practitioners working in the related areas: language teaching and testing.

Professor Chapelle's new book, *Computer Applications in Second Language Acquisition: Foundations for Teaching, Testing, and*

Research, provides a comprehensive analysis of past and current work in the field. It is well organized and clearly written, and should provide an invaluable resource for language teachers, language testers, and SLA researchers alike. It is a substantial contribution to knowledge, and a valuable addition to the Cambridge Applied Linguistics Series.

Michael H. Long
Jack C. Richards

Thanks

I am indebted to all members of our profession who have identified and addressed substantive issues of practical relevance to language teaching and assessment, especially Lyle Bachman, Mike Long, Teresa Pica, and Peter Skehan. I hope the influence of their work is evident and constructively built upon in this volume.

I thank my colleagues and friends who got me interested in the topics covered in this volume over 20 years ago, especially Lyle Bachman, Doug Brown, Bob Hart, and Joan Jamieson. I hope each of them sees this work as a worthwhile product of their teaching. I also thank Mike Long and Alison Sharpe for encouraging me at the start of this project as well as Julia Harding for her careful editing.

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I thank those who waited patiently for so many years while I worked on this project, especially Tess.

Abbreviations

CACD	computer-assisted classroom discussion
CASLA	computer applications in second language acquisition
CALICO	Computer-Assisted Language Instruction Consortium
CALL	computer-assisted language learning
CALT	computer-asssisted language testing
CASLR	computer-assisted second language research
CAT	computer-adaptive testing
CMC	computer-mediated communication
ESL	English as a second language
IRT	item-response theory
ITS	intelligent tutoring systems
LAN	local area network
MTMM	multitrait multimethod
SLA	second language acquisition
TESOL	Teachers of English to Speakers of Other Languages
TOEFL	Test of English as a Foreign Language
UCLES	University of Cambridge Local Examinations Syndicate

1 *Historical foundations of CASLA*

At the annual TESOL convention in San Francisco in 1980, interested and curious participants attended Joan Jamieson's and my workshop introducing the use of computer software for teaching English as a second language (ESL). Joan and I had intended the workshop as a demonstration of existing ESL teaching software with an explanation of how such software is written and used in the curriculum. As newcomers to the profession, we had probably accepted uncritically the fact that the computer *was* used for teaching in the ESL program where we worked. We were therefore intrigued by questions from the audience about whether the computer *should be* used for language teaching. Various forms of this question – whether or not computers should be used for language teaching – were echoed throughout the following decade, but during the 1990s the question gradually changed from 'Should the computer be used in second language teaching?' to 'How can the computer best be used in language teaching?' As we enter the 21st century, everyday language use is so tied to technology that learning language through technology has become a fact of life with important implications for all applied linguists, particularly for those concerned with facets of second language acquisition (SLA).

Forward-looking members of the profession have suggested that the nature of communicative competence has changed in a world where communication occurs with computers and with other people through the use of computers. Writing about communicative competence in the 21st century, Rassool points out:

> in a world increasingly driven by (a) the need for innovation through research and development (R&D), (b) the multilevelled changes brought about in our everyday lives as a result of the nature and speed of technological developments, (c) the volume and range of information available, and its open accessibility, (d) the multimodal features of electronic text as well as (e) its interactive nature, we require significantly *more* than just the ability to read and write in a functional way. (1999: 202; emphasis in original)

If, as Rassool suggests, 'communicative competence refers to the interactive process in which meanings are produced dynamically between information technology and the world in which we live' (Rassool, 1999: 238), language learners are entering a world in which their communicative competence will include electronic literacies, i.e., communication in registers associated with electronic communication (Murray, 2000; Warschauer, 2000).

As a consequence, anyone concerned with second language teaching and learning in the 21st century needs to grasp the nature of the unique technology-mediated tasks learners can engage in for language acquisition and how such tasks can be used for assessment. Language learners typically use computers at least to write papers, receive and send e-mail, and browse the World Wide Web; one challenge for language teachers is to shape some of their computer-using experiences into language learning experiences. To meet the challenge, the study of the features of computer-based tasks that promote learning should be a concern for teachers as well as for SLA researchers who wish to contribute to knowledge about instructed SLA. Many learners will be required to prepare for computer-assisted language tests such as those developed by the Test of English as a Foreign Language (TOEFL) program and the University of Cambridge Local Examinations Syndicate (UCLES) as well as the many Web-based language tests, including those being developed for languages of the European Union through the Diagnostic Language Assessment (DIALANG) project. Therefore, test users need to understand the issues involved in selecting such tests and helping learners prepare for them; equally critical is the knowledge of computer-assisted language testing required of test developers and researchers who construct and evaluate these new testing procedures.

To date the need for an understanding of computer-related issues in SLA has not been met by a coherent set of principles for examining past work and plotting fruitful directions. Instead, cross-disciplinary perspectives have been applied to individual efforts at development and evaluation of computer applications in second language acquisition (CASLA) – perspectives which may enrich the knowledge base concerning computer capabilities and potentials for design and evaluation. Despite the value of cross-disciplinary input, the array of computer-related methods, concepts, and initiatives presented to applied linguists can be overwhelming. Moreover, substantive progress in CASLA requires that its identity be defined, including principles for evaluation drawn from relevant work in applied linguistics. This book lays out such principles to delineate the domain of CASLA as defined through computer-assisted language learning,

computer-assisted language testing, and computer-assisted second language acquisition research. This chapter and the next begin by defining CASLA first through historical development in each of these areas and then in relation to other fields that have influenced CASLA. The following chapters focus on evaluation issues pertaining to computer applications in each area, and the final chapter suggests directions for future work on the basis of needs identified across areas.

CASLA before the microcomputer

CASLA began with projects exploring development and use of computer-assisted language learning (CALL)[1] within the field of educational technology and was therefore shaped by perspectives in education as well as by computer hardware and software developed for purposes other than language instruction (Kerr, 1996; Saettler, 1990). In the US, computer-assisted instruction was first used in the 1950s, but examples of CALL are not documented until the 1960s, when a number of projects were undertaken to explore how the computer could be used for foreign language instruction in higher education. With a few exceptions, such projects were initiated by an individual who used computer equipment and software which had been acquired on campuses for other purposes. For example, Collett (1980), in New Zealand, reported that the idea for his French program came from a colleague in physics who had used the university's mainframe for computer-assisted instruction. Boyle, Smith, and Eckert (1976) reported a computer-based diagnostic French test also developed on a mainframe computer at a university. In the 1960s and 1970s, these small-scale individual projects, along with a few larger efforts, comprised the first experiences with CASLA.

CALL in the 1960s was supported by mainframe computers connected to terminals on a single campus or by telephone lines to terminals off campus. Computer-based learning activities, called 'courseware' were developed using programming languages and were stored on a mainframe for students to access as needed. The mainframe computers and their general-purpose programming languages of the 1970s were able to support the basic interaction

[1] Computer-assisted language learning (CALL) was the expression agreed upon at the 1983 TESOL convention in Toronto in a meeting of all interested participants. I have retained this term throughout this volume to refer to the area of technology and second language teaching and learning despite the fact that revisions for the term are suggested regularly.

required to implement the instructional design for this era of CALL. By today's standards, courseware was not technologically sophisticated even though it was often carefully planned. The fact that the software was stored on a single mainframe at an institution allowed for record keeping in a central location and communication among users. The mainframe also meant, however, that expenses were incurred for writing and using courseware. Because early CALL users were participating in expensive innovation, pressure existed to ensure that CALL was time well spent for learners.

Despite obstacles such as cost, individual language teachers throughout the world were fascinated by the prospects CALL appeared to offer. In the UK, for example, Rex Last and Graham Davies had each been exploring the construction of authoring software (which would simplify production of CALL) for years before they met in 1979.[2] Their individual experiences (e.g., Last, 1979) later became a valuable resource for an early commercial producer of language learning software in the UK. Davies' experience also made him the logical choice to head the government-funded National Centre for Computer Assisted Language Learning established in 1985.

The best-known early CALL project in North America was initiated as one part of a larger computer-assisted instruction project at Stanford University in the Institute for Mathematical Studies in the Social Sciences directed by Richard Atkinson and Patrick Suppes. The project began in collaboration with IBM, and later received funding from federal government sources. Atkinson's early research on learning foreign language vocabulary (Atkinson, 1972), still cited as having useful implications for principled design of CALL (N. C. Ellis, 1995a), was based on his mathematical learning theory rather than on then-current foreign language pedagogical practices. Atkinson (1972) found that learning, as measured by a test a week after the instruction, could be optimized significantly by having a computer program select items for practice on the basis of learners' past history of performance and item difficulty.

The work at Stanford was important also because its directors, Atkinson and Suppes, went on to form the Computer Curriculum Corporation in 1967, which continued to provide instruction in English as a second language (Saettler, 1990: 308). IBM also initiated an early project at the State University of New York at Stony Brook by funding experimental CALL materials for German (Elling, 1995).

[2] I am grateful to Graham Davies for the historical information he provided. For an account of past work in Europe, see Davies (1989; 1993).