Book Review

Artificial Intelligence in Second Language Learning

Dodigovic, Marina (2005)


This book is, at the most general level, an attempt to meet an objective which has been pursued for some years within the field of Computer Assisted Language Learning (CALL), namely to bridge the gap between the different disciplines that are relevant to CALL. In order to achieve this general goal, the author proceeds in a both exhaustive and cross-disciplinary manner. In fact, it is not usual to find a volume that covers so many CALL-related issues and views in such a comprehensive way and with such insight. Being approximately 270 pages long, it becomes difficult, if not impossible, to deal with each and every topic in great detail. And it is indeed not necessary, since the book gathers a number of insights deriving from a heterogeneous group of disciplines, but it does so with a clear pedagogical aim in mind. The aim is to improve the actual learning of a specific language skill within a given educational context by developing a specimen of ICALL (Intelligent CALL) software on the Web. The latter sentence could summarize the whole book, so we will expand it to provide a closer look at the fundamental core of Dodigovic's work here.

The author departs from a pedagogical problem she has to face in the course of her professional career. This problem is the need of a specific student population (University learners of English as a Second Language with Chinese and Indonesian as their L1) to improve their language competence and performance in academic writing (English for Academic Purposes) beyond a certain level where some common errors have been fossilized. Thus, the educational context has been well established from the outset, as well as the problem that has to be resolved. This is one of the strengths of the author's approach, since we agree with some CALL researchers when they criticize the tendency to use CALL and related technologies as providers of solutions for their own sake, without previously analysing a given educational problem that needs to be solved (Clark 1994: 28; Chapelle 2001). In the case of Dodigovic's book, the existence of a real learning problem sparks off the development and implementation of a CALL solution, and not the other way round. Then, after assessing the clear terms and boundaries of this pedagogical problem, the author chooses a solution brought about by the innovative field of Intelligent CALL. This choice has not been made by virtue of the novelty of the technology, but due instead to its pedagogical effectiveness and high degree of appropriateness to a given educational context. This solution implies the development and implementation of an Intelligent CALL Tutor on the Web whose aim is to improve the students' academic writing skills by interacting with them in a dynamic and "intelligent" way, raising the learners' awareness of their errors, correcting them and guiding the students through the writing process in order to help the correction and de-fossilization of these mistakes. Therefore, a great deal of pre-development work and research needs to be undertaken. The book itself is the result of a deep and informed reflection about this process and provides a thorough discussion of all of its phases. To
put it in the author's own words, "the Intelligent Tutor whose development and evaluation is described here is intended to exemplify the CALL development practice in its most comprehensive approach" (p. 270). In our view, the field of CALL would significantly be enriched if it could find many more examples of this kind of research and development work.

The book, then, contains plenty of research that sheds light on the software development process. This is in line with a trend in CALL that recommends all instances of software development to have a sound foundation on relevant research. This is why a significant part of the book is devoted to the report of the research work and the review of relevant literature. Nevertheless, this theoretical background at all times keeps an eye on the pedagogical standpoint that is at the heart of this CALL project. Consequently, research provides the theoretical underpinnings to support a very clear line of action that is well rooted in pedagogical practice and based on a specific educational situation. Then, the book is a two-way journey between theory and practice, both of them interacting with each other in a dynamic way. We believe this is another major strength of the book.

The pre-development research work informs the final technological decision of developing an Intelligent CALL program on the Web, rather than any other solution that could have been possible. We think this is the most plausible solution, given its feasibility, for two main reasons. On the one hand, the area of ICALL holds a promise to overcome the drawbacks of former CALL programs in terms of feedback quality and pedagogical effectiveness, as extensively suggested throughout the book. On the other hand, the Web is undoubtedly the appropriate environment to deliver a dynamic ICALL tool, such as this, in a flexible manner.

Apart from the general pedagogical aim that we have just discussed, the book has several other objectives that are closely related to it:
- To reflect upon the possibility that adult learners improve their learning of a Second Language.
- To assess the usefulness of Intelligent CALL to improve Second Language Acquisition (SLA).
- To conduct a literature review of different fields and disciplines that can provide a sound background to ICALL software development.
- To present a case study of a CALL Research and Development project, in order to help other researchers or developers conduct similar projects.

Consequently, the resulting scope of topics and views depicted in the book is very broad, so it can be of great interest to a heterogeneous collection of readers. The author's background is similarly very rich, since she is a CALL researcher, practitioner and developer. She is privileged in the sense that she is also a computer programmer, thus incorporating first-hand computer expertise to the hard task of developing pedagogically sound CALL software.

The book comprises 6 chapters, an introduction, a concluding section, 3 appendices, a bibliography and a subject index.

Chapter 1 gets the title from a question of interest for all language teaching practitioners: "Can Another Language be Learnt?". The problem depicted from the very beginning, namely that university students with a reasonably good command of English still make mistakes in academic writing, helps to sharpen the initial focus. Thus, the question becomes "Can our adult NNS (non-native speaker) university students learn how to improve their erroneous academic English?" (p. 13). In order to answer these questions, the author draws on a comprehensive review of the research literature in the field of Second Language Acquisition, especially of those theories and findings closely related to writing skills, learners characteristics and variables, learning strategies, motivation, interlanguage theory and language ownership and learnability. The two key concepts that are taken into account in this section are: Interlanguage (IL) and Error Analysis (EA). The working hypothesis is that Artificial Intelligence and Natural Language Processing (NLP) can be applied successfully to prevent or undo error fossilizations of the learners' writing errors by conducting an exhaustive investigation of the Interlanguage and the typical errors of a given student population. The findings of
such investigations would inform the development and implementation of an ICALL Tutor program that is ready to help those students improve their academic writing skills in English. The evidence from this research review seems to lead us to conclude that the best way to help students improve their linguistic competence is by explicit instruction, opportunities for practice with a focus on form (and meaning), language awareness and error correction. This ICALL project is an attempt to use an application of NLP to implement these SLA concepts in real practice. Therefore, the answer to the question posed at the beginning of this chapter is positive, provided the cognitive, affective and individual needs of the learners are properly met. Accordingly, the next logical step in the ICALL development process is to conduct a thorough needs analysis, which includes "what we know about both our students and the criteria for successful instructional hypermedia design" (p.44). All of these factors will merge in the building up of some key specifications to develop the intelligent software product. Here is one example of the perfect marriage between theory and practice in CALL development, which is achieved from the needs analysis: "our theorising has thus led us to a very practical step - outlining the specification framework for a tutor from which we expect to contribute to much L2 learning" (p. 45). The final objective is to achieve a perfect match between the learners needs and the characteristics of the ICALL software in order to improve learning outcomes.

Chapter 2 also has a questioning title: "Where Does Research End and CALL Development Begin?". In this section, the relationships between research and development within the field of CALL are discussed, again with the incorporation of a comprehensive literature review. After analysing different research models in SLA and CALL, the author adopts an eclectic approach to research. According to her account, the 2 phases of the CALL development process where research is more likely to play a major role are needs analysis and evaluation. We could not agree more with Dodigovic when she states that "research can and sometimes legitimately needs to either precede the development of CALL programs or accompany it at various stages (...). Nonetheless, research should also follow the application of such CALL software. Therefore, the life cycle of a software program can be said to have completed a full cycle - from research, via development back to research" (p. 53). This chapter includes a detailed description of the ICALL project and its research methodology, and also incorporates some reflections about CALL project management in general from the point of view of Research and Development which will undoubtedly be of use for similar project managers and coordinators.

Chapter 3, "Why the Web?", aims to justify the chosen technology for the delivery of the ICALL project. This justification is twofold. From a theoretical point of view, this technology has the right features that can make an innovation widely accepted among academia. From a more pedagogical and practical perspective, the Web, with the added value of Computer Mediated Communication, provides a high degree of flexibility for the efficient delivery of the Intelligent CALL Tutor.

Chapter 4 is called "Can Computers Correct Language Errors?" and deals with the different technologies within the field of Intelligent CALL that can provide linguistic error detection and correction. Therefore, the chapter is an account of technological fields such as: Parsing, Natural Language Processing, Artificial Intelligence, Intelligent CALL, Intelligent Tutoring Systems, Computational Linguistics, Speech Recognition and Synthesis, etc. The author's aim in this chapter is to find out whether computer technologies can nowadays detect and correct language errors occurring in L2 learner output. As a result, in addition to a comprehensive review of these technologies, the focus in this section lies on the concepts of feedback and reinforcement. Different feedback types and possibilities are thoroughly described and discussed. The conclusion drawn at the end of the chapter is that computers can detect and efficiently correct not only NS (native speakers) discourse, but also NNS (non-native speakers) errors, provided the proper technology is used. The author of this book "has made an effort to try the computer out in its capacity of NNS error correction" (p.139), which, in our view, is a very welcome innovation in CALL.

Chapter 5, "How to Develop an Artificially Intelligent Language Tutor?", describes the development process carried out to create a specific example of ICALL software, the
Artificially Intelligent Language Tutor on the Web developed by Dodigovic. Before developing the program, three research studies are described that cast light on what features the piece of software should integrate. These studies analyse, in turn, the various learning styles of the target student population, the characteristics of the target language of instruction (academic written English), and the features of the student interlanguage. The data resulting from these studies are subsequently used by the author to develop a piece of Intelligent CALL software (the Tutor) that could meet the needs of the students and the given learning scenario. The chapter also includes a description of how the program was technically developed by using a programming language called SICTUS PROLOG (by Alyson Fowler and the author herself), as well as some examples of how the program actually works.

In chapter 6, "How Does it Work?", the evaluation of the ICALL software tool is discussed. The evaluation included in this section is mainly formative, with the inclusion of a research study as well as the results arising from the evaluation carried out by teachers and students. Summative evaluation is also present, but in a more limited way. As the author herself recognizes, summative evaluation is not complete in this case, since the ICALL development project was not fully finished at the time of writing the book. From a global perspective, the ICALL software depicted in the book yields satisfactory results both in terms of software engineering and pedagogical effectiveness, although there are some areas in need of further improvement, such as the graphical user interface.

The book is a very comprehensive, detailed and interdisciplinary account of the Research and Development process of a successful example of Intelligent CALL software. The field of CALL can benefit to a great extent from sound research-based and pedagogically-driven projects such as the one described here. Books such as this will no doubt help us ascertain which areas of language learning are most successfully dealt with by the use of CALL technologies.

References


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