

CALL: a Strange Attractor in Language Education in South America

Vera Menezes (UFMG)

*School of Letters, Federal University of Minas Gerais (UFMG), The National Council for Scientific and Technological Development (CNPq), Minas Gerais State Science Foundation (FAPEMIG), Brazil
vlmop@veramenezes.com*

Under the assumption that language education is a complex system by its very nature, this paper reflects upon the history of CALL in the light of chaos/complexity theory metaphors. The history of foreign language teaching has shown us that the normal route of the educational system has suffered unexpected changes along its path: from codex and gramophones to computers and the Internet. But the impact of the Internet seems to have caused the strongest turbulence. The system has been destabilized by the new technologies evolving into a strange attractor, creating new bridges spanning the globe. Learning a foreign language in South America is by no means an easy task as there are usually few opportunities for learners to interact with speakers of languages other than Spanish and Portuguese, but technology has always been the main element to bridge the distance between learners and speakers of other tongues.

1. Language education as a complex system

A dynamic complex system (e.g. society, language, language education) is one whose components or agents interact among themselves, changing over time and exhibiting emergent properties.

Society changes and so does language education which suffers influence of the context. In the agrarian age, we had home education in the form of tutoring. In the industrial age, schools followed the factory model, and in language education, we had the boom of labs. In the information age, education is influenced by global models and the school walls can be metaphorically demolished. Communities of practice have been created and network projects offer the language learners the chance to use the language by interacting with other language users in different parts of the world.

Complex systems are open, that is, they are far from equilibrium. Educational systems exchange information with the context; they influence the context and are influenced by it. One example is innovation. Language education is open to innovations, such as new learning and acquisition theories, new pedagogical models, and new technologies. In a metaphorical way, innovations can be considered as a kind of energy which moves the system to different routes. Innovations cause disequilibrium in the system and disequilibrium is a necessary condition for the development of a system.

2. The history of technology

The history of technology demonstrates how it has been impacting the dynamics of language

learning since the creation of written technology. Technology has been a necessary element in language education since the volumen, a scroll of papyrus, to codex, a collection of sheets attached at the back, whose format, is still found in the books we know today. The socialization of the written technology was not a simple process. The book faced the same problems computers face nowadays. The codex was expensive and just a few had the privilege to own one.

Gutenberg's design of metal movable type, the press, represented the first technological revolution in language education. According to Kelly (1969:258), "in the ancient world, books were scarce, cumbersome, and difficult to produce. Booksellers had them copied by slaves, one reader dictating to a roomful of scribes." Books were very expensive and both teacher and the book belonged to the student. Kelly adds that "the only text in the medieval classroom was in the hands of the teacher, the pupils taking down both the text and comments from dictation". He also said that Comenius defended the use of books in the classroom, but educators such as Lambert Sauver wanted them to be forbidden in the classrooms. According to Kelly (1969, p.261), Sauver's advice was: "Give your pupils the book to read at home, as a preparation for your teaching, but forbid them to open it in the class; their ears alone must be occupied there. Not very far from now, during the audio visual period, the students were also forbidden to open the books during the oral tasks.

In 1878, the gramophone was invented and the first audio material for language learning was produced in the very beginning of the last century, by Linguaphone. Visual and sound technologies

kept being aggregated to language learning. In the thirties, cartoons to teach basic English were produced by Walt Disney Studios and in the forties the same studios used actors for the March of Times series, but such sophisticated technology was not popular at all in South America.

Also in the forties, tape recorders were introduced in schools and mainly in foreign language classrooms. The war context had a huge impact on language teaching in the United States and by the 1950s language labs began to emerge. In South America, the scarce old audio labs with isolated cabins were replaced by computer labs before all the schools had got its traditional lab. Computers brought together all the previous gadgets: typewriter, pens, pencils, mail, tape recorder, notebook, book, slide projector, video, cinema, radio, TV, lab material, films, telephone, fax, printer, CD and DVD players, overhead projectors, etc.

Learning a foreign language in South America is not an easy task as there are usually few opportunities for learners to interact with speakers of languages other than Spanish and Portuguese. Technology has always been the main element to bridge the distance between learners and speakers of other tongues in our continent. Although personal computers were available in the eighties, the real spread of this new technology only happened with the emergence of the Internet in the 90s. No register of significant experiences with computers can be found before that. But we are experiencing a great shift nowadays.

As revealed in the studies of Rogers, Medina, Rivera, & Wiley (2005) and Chambers and Bax (2006), when an innovation appears, the first attitude is of distrust, fear and rejection, but little by little, new practices are incorporated into the system and a normalization state is achieved. It was not different in Brazil. Going back to the complex system theory, we can rephrase this normalization process in the following way. When a new element enters the system it causes some turbulence and disorganizes the system, but out of disorder or chaos, a new order is achieved and the system self-organizes.

Self-organization is an important characteristic of complex adaptive systems. Out of disorganization emerges a more ordered system. One example is the widespread adoption of new technologies nowadays. In spite of the natural resistances, the computer is now an inseparable part of language education, although in different

scales. I dare say that we are still living some period of distrust and turbulence.

Today, 20 million out of the 40 million Internet users in Brazil do not have computers at home, but they usually go to Lan Houses which are available everywhere, even in poor neighborhoods. Part of this population can also go to Computer Centers supported by the government, but in those centers they can neither play games nor access Orkut.

3. The history of CALL in Brazil.

The CALL pioneer in Brazil is Dr Heloisa Collins (PUCSP). She developed a distance learning ESP reading course with one MA student, in 1995, using the *Bulletin Board System*, which depended on a telephone connection. Collins was also responsible for other courses involving not only reading, but also oral skills and most of them were part of a large teacher training program, *Teachers' Links*, supported by her state government. A second pioneer, Dr Denise Braga (UNICAMP) has been responsible for the project *Read in Web* since 2000 for graduate students. Another relevant project has been developed by a pool of teachers from UNESP. It is the *Teletandem Brasil: foreign languages for all* that aims at providing Brazilian university undergraduate students and university students from around the world with free and democratic access to online cooperative processes of learning and teaching foreign languages (<http://www.teletandembrasil.org>). In the south of Brazil, another pioneer is Dr. Vilson Leffa (UCPel). He developed *ELO* (Electronic Learning Organizer), an authoring system for producing learning activities, with emphasis on language teaching. With *ELO* one can create different kinds of teaching activities, including reading with a built-in dictionary, open-ended questions and so on.

I myself and my group started working with CALL in 1997 teaching undergraduate students at UFMG. We were the first ones to include CALL as part of our curriculum activities. In spite of the expected resistance, from more traditional teachers, we managed to offer several online courses including undergraduate and graduate courses on Applied Linguistics issues. The new technology, for the first time, allowed our students to be agents, and not mere repeaters and language could be used in real social practices.

But, the system is still undergoing turbulence. In 2008, we offered an asynchronous online course on English Reading Strategies for 2000

undergraduate students who needed to improve their reading skills in English. It is worth mentioning that the material was developed in a collaborative project involving researchers and collaborators in several Brazilian universities. This decision caused much distress among some peers and staff as some of them did not trust the quality of a course for such a huge number of students.

Rogers et al (2005) explain that “as individuals adopt an innovation, their microbehavior contributes to the macrosystem-level scale of behavior. As the rate of adoption of an innovation accelerates and innovation diffusion takes off, emergent adaptive behavior occurs at the system level.” I guess that was what happened with this Brazilian group of CALL pioneers. As any complex system, educational systems do not behave in a linear way, and small changes in the system can have a major impact in the whole system. As the pioneers for CALL in Brazil worked also with teacher education, their micro experiences contributed to spread CALL in our country. Their works inspired other teachers in different parts of the country, but were also inspired by the pioneers in other parts of the world.

Abandoning a highly structured and teacher centered methodology in favor of a flexible and student-centered approach disturbs the system although both methodologies can perfectly co-exist. We can understand it as bifurcation of the system which becomes unstable with the introduction of an innovation and all the by-products which come together. The system is then attracted to a new cycle and exhibits a new behavior, although the previous one can also be observed.

A complex nonlinear system converges towards a *strange attractor*. Sade (2008) explains that the word “attractor” may lead us to think that it is something that attracts, but, as a matter of fact, attractor can be understood as *repeated series of states – orderly and recurrent patterns of movement* (Taylor, 2001, p. 185) in which the system stabilizes.

As language education is a non-linear system, tendencies may emerge and remain stable over a relatively long time. That is the case of the use of books, but creativity, as pointed out by Miller (2004) “is an emergent phenomenon patterned by strange attractors, which govern the complexity of information in dynamic flow”. Reigeluth (2007) says that “a strange attractor is a kind of fractal that has a powerful influence over the

processes and structures that emerge in a system undergoing transformation” and Rogers et al (2005) add that it is “strange” because it is orderly when it is expected to be random; attractor because it “attracts” or draws order to itself out of seeming chaos”.

Language education has its strange attractors that never settle down into any normal rhythm. New technologies are among those strange attractors. Books, audio and video technology, and now computers are responsible for changes in the system.

Language education in general is undergoing a creative turbulence with computers and CALL is a strange attractor in South America. Small changes in complex systems can result in disproportionately large effects.

4. The butterfly effect in South America

Small changes in the initial condition of a dynamical system may produce large variations in the long term behavior of the system. The idea is that the flapping wings of a butterfly in Brazil may affect a chain of events leading to a tornado in Japan. The impact of computers in education is equivalent to the metaphor of the butterfly effect. Had computers not entered the system, the route of the educational system might have been totally different. The impact can be felt in diverse elements of the system: educational policies, school, teachers, students, research and technology itself.

One example of the impact in educational policies is the assistance of the World Bank to help developing countries in bridging the digital divide. Another is the researchers’ attempts to develop cheaper computers and free software.

Many dissertations and theses have been produced on CALL in South America universities. The main themes are: collaboration; feedback; interaction; online classrooms; students’ and teacher’s perceptions, digital literacy, etc.

In schools, language labs have been replaced by computer labs, curricula have been reformed and digital literacy became part of it. Digital libraries offer free access to books and lots of free online journals appeared on the web minimizing the cost with books and other publications. In Brazil, for example, 191 federal institutions have free access to 12,365 international journals and 126 databases on different scientific areas. In Colombia, EC-CALL Journal was created in 2007.

There is a boom in distance education programmes and in some traditional schools the

tendency is the co-existence of traditional courses and computer mediated activities. Online content has been produced in collaborative projects and some of them are sponsored by the governments. One example is *La Enciclopedia Virtual Paraguaya*, which gathers together content for all the educational levels, including languages. Free material is available on the net and teachers have been experimenting new ways of teaching. They have been engaged in collaborative activities both for material production, publishing and also for reflection about their practices. Interaction among peers increased and associations were created. One example is the AVEALMC in Venezuela. Different communities of practice were also created. In Argentina, for instance, we have the *Edublogger Argento* which hosts educators' blogs.

Despite the several positive aspects, there are also problems teachers must cope with. Online classes have more students, but the salary is the same. Even in traditional courses, the students go on interacting with teachers after the classes by email, but they are not paid for this extra task.

Autonomous learning is encouraged and the students become authors as they can now publish and have their texts read by different people. They can engage in different communities of practice and there are several web pages where one can find a partner to interact with.

5. Conclusion

With online CALL there was a shift from local to global interactions. Learners and teachers in South America are not limited anymore to textbooks and to occasional interactions with other speakers. They have choices: teachers can choose free material to complement their own.

For language acquisition, a necessary condition is agency, using the language to do something. In spite of many traditional materials published on the web which do not offer students any chance to engage in authentic linguistic social practice, the learners are autonomous enough to be attracted into strange attractors which offer them the opportunity to be agents of their own learning. Our role as CALL teachers is to "disturb" a zone of stability and provoke the chaos that results in a zone of creativity (edge of chaos) where small changes can occur, creating significant effects on learning processes. In order to do that we must free our students from the school walls and empower them to act in the realm of language social practices.

The increased connectivity among CALL specialists has certainly contributed to what we

do today. We are nested in the world history of CALL and as so, our history is just a fractal of that world history. As fractals are recursive processes, I am sure that the fractal I presented here is the starting point of subsequent, unexpected and creative new phases in the future collective history of CALL.

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