REVISITING CURRENT PARADIGMS IN COMPUTER ASSISTED LANGUAGE LEARNING RESEARCH AND DEVELOPMENT

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Abstract:
Because Computer Assisted Language Learning (CALL) is a multidisciplinary field, many researchers in the area believe it is necessary to develop a more homogenous and rigorous approach to CALL research and development. This paper discusses the current state-of-the-art in in the field and proposes a more inclusive approach to design and implement CALL projects. The opinions and facts presented here are based on the procedures used to develop the TAGARELA system.
Keywords: Computer assisted language learning, TAGARELA, L2 teaching.

1. Introduction

Computer Assisted Language Learning (CALL) is a multidisciplinary area of research that encompasses the study of computer applications in language teaching and learning. The

discipline is usually viewed as a subfield of Computer-Assisted Instruction (CAI). While CAI is a broad term used to define teaching and learning through computer interaction for all disciplines, CALL focuses specifically on language instruction. For Levy and Hubbard (2005), CALL includes activities such as technology-enhanced language learning, network-based language learning, Web-enhanced language learning, and information and communication technology for language learning.

In the last two decades, the number of CALL practitioners and researchers around the world has increased drastically, following the advances and affordability of technology. Since the end of the 1990's the increasing popularity of the World Wide Web has brought a new vitality to CALL development, and has revealed new possibilities for the use of computers in language instruction. Nowadays, computers are widely used in foreign language teaching and learning (FLTL) to help learners experience the target languages and cultures. Currently available technology allows for multimedia presentations, web-based TV/radio/news, emailing and chatting with native speakers, among many other uses. Computers-Mediated Communication (CMC) is a field in itself, and several studies have discussed the use of CMC in FLTL (cf., e.g., Warschauer, 1997; Paramskas, 1999; Smith, 2005). More recently, an increasing number of institutions have been offering language courses in virtual language classrooms, where students and instructors interact in a virtual environment, instead of a regular classroom (cf., e.g., Humpel, 2003; Felix, 2002), and the popularity of distance foreign language learning is increasing. In summary, if we consider CALL in its broader sense, we could say that any time people use a computer to learn, practice, or interact in a foreign language, they are doing CALL.

Because of the recent dissemination of computer technology, research in CALL has taken new directions, and what is now considered to be "established CALL" (see definition in section 2) was unthinkable two decades ago. This paper presents one way of viewing what CALL practitioners and researchers have been doing lately, and proposes an analysis of their choices. One of the goals of this work is to remind the CALL community that CALL cannot be fully dissociated from development and implementation. Otherwise, we run the risk of being prisoners of technological choices that were not made with foreign language instruction in mind. The other objective of the paper is to defend approaches to CALL research and development that are inclusive and multidisciplinary in nature, taking into consideration different points-of-view from CALL practitioners, SLA researchers, linguists and computer scientists. Section 4 presents one example of a recent research project that integrates foreign language pedagogical goals and needs into the development of new technology for CALL.

2. Current Paradigms in CALL Research

Levy and Stockwell (2006) differentiate between two approaches to CALL research, development and integration. They call the first one "established CALL," and the second one "emergent CALL." According to them, the basic difference between established versus emergent CALL is in the way CALL practitioners and researchers interact with technology:

> Established CALL involves technologies that are well established and accepted. The label is used to indicate mainstream activity in contrast to more specialized activity involving new and emerging technologies. Practitioners focus on using and evaluating CMC modes for language learning and, when CALL

materials are developed, well-known authoring tools such as *Hot Potatoes* and *BlackBoard* are used in a straightforward way (i.e., without advanced adaptations). (Levy and Stockwell, 2006, p. 246)

Established CALL practitioners and researchers tend to focus their efforts on evaluating and incorporating existing technology into teaching and learning practice. As Levy and Stockwell (2006) point out, many of these practitioners believe that focusing directly on technology development is a distraction from the main activity of language teaching. According to Hubbard (2004), this characteristic generally distinguishes CALL professionals from language teaching professionals. Hubbard defines the goals of foreign language teaching professionals as being concerned primarily with the integration of well-established technology into current methodologies in FLTL. The use of technology in their everyday practice is their main goal, and their contribution to the field is based on innovative pedagogical practice through the design of new language-learning tasks, and the integration of CALL and non-CALL approaches in FLTL curricula. They also play a critical role in the evaluation of existing technology in contextualized settings with real language learners.

The great danger of focusing exclusively on the "established" approach to CALL is to put the discipline in a straightjacket. CALL in its origins was very much connected to system design and implementation. When PLATO (Hart, 1995) and TICCIT (M. David Merrill, 1980) were first conceived in the 1960's and 1970's, there were no text editors, no Internet, and no personal computers. The only way the field could advance was through the development of large-scale systems. Nowadays, different types of commercial software can be incorporated into CALL practice. This fact brings a

great advantage to CALL practitioners, however there is no reason to believe that developing technology to cope with the specific needs of language learners and instructors is a profitless activity.

Computers are tools to perform certain tasks. The way they perform those tasks is defined by the needs of their users and the ability of software engineers to develop appropriate programs. Generally, commercial off-the-shelf software is not considered to be the state-of-the-art material for any academic discipline. In fact, most of the time, this type of software has no use at all. When researchers of computational biology, chemistry or physics need a computer to perform a task they first specify the task, then they develop the program to handle it. It is unclear why computational language learning should be any different. CALL users have specific needs that are different from the needs of native speakers, and foreign language instructors use methodologies that reflect their beliefs on how foreign languages are acquired. If a commercial software happens to fulfill certain needs of learners, and, at the same time, fits into a given methodology, it can be incorporated into current FLTL practice. However, we do not see any arguments for limiting CALL research and implementation to these convenient coincidences.

The second group of CALL practitioners and researchers believe that to advance CALL as a discipline their research should focus on the development of the technology used. Levy and Stockwell (2006) call this approach "emergent" CALL:

> In emergent CALL, we are very interested in looking at the technology to see what it can do and what it cannot. When there are shortcomings, these may be addressed. The approach may involve revisiting well-established and accepted technologies and seeing if their features can be improved or redefined for language-learning purposes. ...In emergent CALL, researchers directly engage with the technology itself. ...As far as

> emergent CALL is concerned, teacher-designers, developers, and researchers are currently looking closely at language learning programs involving speech-recognition applications, broadband audiovisual technologies, online teaching systems (with human tutors), intelligent tutors (ICALL – with computer tutors), mobile technologies, fine- grained design decisions (the optimal annotation), hybrid solutions, new authoring tools and techniques, and compatibility of technologies (e.g., knowledge pooling, reusability issues). (Levy and Stockwell, 2006, p. 242)

The term "emergent" can be misleading, giving the impression that research in this area is not consolidated, or that it is a new approach to CALL. As noted before, CALL appeared for the first time as a discipline with the development of CALL technology. It is important to notice that researchers in emergent CALL do not form a homogeneous group. At one end of the spectrum we find CALL experts that have some interest in technology, and at the other end we see computer scientists that want to develop CALL tools but who know very little about FLTL. Researchers of what could be considered emergent CALL do not even attend the same professional conferences. While members of the Artificial Intelligence community, who work with intelligent language tutoring systems, typically go to conferences such as AIED, ITS, ICALT, ICCE, and UM, members of the ICALL community, who develop ICALL systems to be used in FLTL, generally present their work at CALICO, EUROCALL, and WORLDCALL. Of course there are researchers that go to both. These different orientations inside the group of emergent CALL is very productive if ideas are shared. Unfortunately sometimes the different points of view seem to be obstacles to dialogue and contribution[1].

Another, typically self-imposed, limitation of emergent CALL researchers is the fact that they rarely acknowledge the contribution of established CALL researchers, i.e., people that are more directly involved with FLTL practice. Correspondingly, research projects whose aims were to develop new technologies for CALL have been severely criticized for their lack of integration with existing methodologies and for the absence of reliable evaluation of their products in contextualized FLTL settings.

3. The Multidisciplinary Nature of CALL

CALL researchers look into other disciplines for theoretical foundations for their work, and it has been argued that CALL does not have a sufficient body of work to support independent research (Egbert, 2005). This may be because CALL is a relatively new discipline, or even because CALL is a subfield of other disciplines, such as applied linguistics, and might never be fully independent (Leech and Candlin, 1986). However, if we look closely at the evolution of CALL in the last 30 years, we will see that CALL is the product of an era where multidisciplinary approaches to common problems are the rule rather than the exception. New disciplines that have recently emerged tend to be multidisciplinary in nature.

Levy (1997) lists some of the main disciplines that have contributed to the evolution of CALL, such as psychology, instructional technology, artificial intelligence, human-computer interaction, computational linguistics, and applied linguistics. It is important to emphasize that the contribution of each of these disciplines is not restricted to their specific body of knowledge. They also bring with them their methodological paradigms to undertake scientific investigation. Conceptual and methodological differences dealing with the design of experiments and the

formulation of scientific questions have been major roadblocks for full collaboration between CALL practitioners and researchers from different backgrounds (Levy, 1997).

More than ten years ago, Garrett (1995) already identified one of the main challenges for CALL research and development: the integration of language teacher's expertise in the development of CALL systems. She also criticized the lack of support for teacher involvement with technology in post-secondary education. Today, the latter seems to be no longer true, judging by the increasing participation of CALL experts (researchers and practitioners) in conferences such as CALICO and EUROCALL. Nevertheless, the development of new technologies does not seem to be in the agenda of many CALL experts, and interdisciplinary research projects with computer scientists, linguists, and foreign language teachers are rare.

This lack of interdisciplinary work creates a scenario that does not benefit CALL as a discipline; people who develop new technologies do so without thinking about language instruction and acquisition, and people who evaluate the roles of existing technology in language acquisition know very little about the nature of the technology they use. If research initiatives in CALL are limited to what technology can already do, all variables in an experiment have to come from the human side of the interaction, or by using two different existing tools.

In an attempt to establish a common background for CALL work, several researchers have presented arguments in favor of theory based research, focusing specifically on second language acquisition (SLA) theories (see papers in Egbert and Petrie, 2005). However, as Levy (1997) reminds us, theories of acquisition have only been one of the points of departure for CALL research. Several

other CALL projects have taken into primary consideration the actual FLTL practice and methodological choices, or technological development and integration.

One of the arguments Huh and Hu (2005) use to defend the SLA focus in CALL research is based on their criticism of what they call "technocentrism in CALL research":

> If researchers emphasize the technology only and conclude that CALL programs are effective for language learning, it is problematic. The question is what really matters for language instruction, is it the computer, the teacher, the learning environment, the students themselves, or some combination? …By appropriately analyzing participants' interaction and behavior, for example, we can address questions of why a system is not working or how to make it work better. (Huh and Hu, 2005, p. 17)

What Huh and Hu (2005) do not mention is that there is another possibility for those studies. Instead of comparing participants' interaction and behavior while using different systems, or in different educational settings with and without systems, researchers could change the variables within a CALL system in a given experiment to test different working hypotheses. Knowing more about the technology can help us learn more about language acquisition. The reason this third possibility is usually not explored is, again, the lack of interaction between those that develop the technology and those that evaluate its use.

Research projects that incorporate development, research, and testing in real life teaching environments can contribute to the interaction of researchers from different backgrounds, and reduce the gap between those who use and those who develop the technology. Some researchers have perceived this need, and

have developed and/or expanded their investigation programs to incorporate elements of different disciplines (cf., e.g., Amaral and Meurers, 2008; Dodigovic, 2005; Heift, 2005).

4. One Example of Multidisciplinary Research

One of the areas of CALL that has seen some multidisciplinary research projects is the development of language tutors (Heift and Shulze, 2003). In general terms, a CALL tutor is a computer program that evaluates a learner's response and provides some sort of feedback. In its simplest versions, a CALL tutor deals with simple "right" or "wrong" responses to student input. The most common types of exercises used by these tutors are fill-in-the-blanks and multiple choice.[2] These simple CALL tutors work with pre-stored answers, and use pattern matching to decide if the input is right or wrong. In other words, the mechanism used to check answers is comparing them letter by letter with the target answer. Simple pattern matching as a mechanism to detect errors can work well if correct answers are predictable and listable, or if there is no expected grammatical variation in student's response and envisaged errors correspond directly to intended feedback.

One motivation for the development of tutors that can do more than pattern matching is the need to provide personalized feedback to individual learners on language forms and rules. More sophisticated CALL tutors need to be able to perform error diagnosis, and possibly also error correction to generate individualized learner feedback.[3] Systems that are designed to do error diagnosis are usually called Intelligent CALL (ICALL) systems, or Intelligent Language Tutoring Systems (ILTS).

Traditionally, the first step to create ICALL systems has been to incorporate into them some knowledge about its target domain, i.e.,

knowledge about language forms and rules. Since the 1980's, several projects aimed at integrating natural language processing (NLP) techniques into ICALL development, in an attempt to make systems that are linguistically aware (cf., e.g., Weinberg et al., 1995; Rypa and Feuerman, 1995; Heift, 1998; Nagata, 2002). In most projects the emphasis was on modifying or developing parsers, i.e., algorithms licensing syntactic structures, to be used as error diagnosis tools. The idea was to take advantage of the advances in syntactic analysis in NLP to create tools that could complement grammar-focused instruction. Although most of the work on developing or adapting NLP technology for ICALL tutors has been done on syntax, some projects focused on other types of linguistic knowledge, such as Dorr et al. (1995), DeSmedt (1995), and Bailey and Meurers (2006).

To determine the potential role of ICALL systems in the foreign language teaching environment, it is important to understand the foreign language teaching methodologies used, and to establish the needs of professionals working in the field. While some general studies of the expectations of foreign language teaching professionals exist (Levy, 1997; Atwell, 1998, 1999), there is little discussion about the integration of ICALL into the methodologies currently used.

This section presents one example of a project that took a multidisciplinary approach to develop an ICALL system. The project is called TAGARELA (Amaral, 2007; Amaral and Meurers, 2007, 2008, 2009), and its final product is an intelligent tutoring system designed to be used as an electronic workbook in the instruction of Portuguese as a foreign language in the US[4] . What is presented here is a snapshot of the project to illustrate how the development of technology to be used by CALL practitioners can be guided by the reality found in language teaching and learning.

4.1 First Step: Learning about Instructors' Beliefs and Needs

To better understand how an ICALL tutor could contribute to the routine of instructors and learners, a series of interviews were conducted with instructors in the Department of Spanish and Portuguese at The Ohio State University to collect information about their classroom practice. The aim was to find out where, when, and how ICALL could be used in accordance with current teaching practice. During the interviews, the instructors were asked to analyze the stages of their lessons and to point out specific steps that were problematic in terms of pace, goal achievement, participation, student centeredness, elicitation, classroom management, language practice, students' production, and communication. They were asked to correlate those steps with the practice of specific topics, and encouraged to think about how the use of computers could help minimize any possible problems.

Although there are as many teaching routines as the number of instructors for a given language, during the interviews three basic characteristics in foreign language teaching were identified as common practice to most instructors. First, lesson plans are goal oriented. Instructors usually decide on the type and sequence of activities based on the goals of their lesson. In a lesson plan there are usually two types of goals: the general lesson goal, and the specific subgoals to be achieved in each part of the lesson. Second, activities in a lesson are chosen to help students develop one or more of their language skills: reading, listening, writing, and speaking. Third, most lessons are divided into stages with different activities. Some instructors adopt the presentation, practice, production procedure, others use different ways to classify the stages of their lesson, but all said that their lessons were divided into different activities that

had different pedagogical goals. On this background, the findings of the survey can be summarized as follows:

- **Computers reinforcing practice of language form and rules**: Instructors stated that in their classes they do not like to spend time in activities that are meant to reinforce grammar patterns. They say this type of activity can be problematic because it reduces the pace of the lesson; individual differences make it impossible to have all students do the same grammar exercises in exactly the same time. The practice stage is the one that shows the best possibilities of interaction between the classroom activities and automated exercises. Instructors would like such exercises to include activities that help students incorporate new vocabulary into their practice.

- **Respecting individual pace**: Instructors said that some students need more time and more input before they are able to produce appropriate (and accurate) sentences. They would like to have their students (or at least some of them) focus on form and use for while before integrating them into a more complex context where they have to focus on negotiation and meaning.

- **Exercises for Remedial work**: When students start producing sentences that make no sense in the target language due to structural errors related to topics that have been seen before (wrong word order, inaccurate morphology, inappropriateness of functional words, misuse of tenses, etc), instructors face a difficult dilemma of stopping and addressing the problem or trying to keep the communicative goal of the activity. Computers could help minimize such problems by reviewing previously presented structures.

- **Practicing receptive skills**: Another area that instructors pointed out as problematic to classroom dynamics is integrating the practice of receptive skills (reading and listening) into their lesson plans. Due to individual differences this type of activities compromise the lesson pace. However, they pointed out that exercises dealing with receptive skills are very important to

the overall process of learning a foreign language. Without the appropriate input, students may never be able to build up the appropriate cognitive apparatus necessary to be proficient users of the target language.

- **The importance of human interaction**: Instructors pointed to the production stage as part of their class they considered to be the most pleasant, and they did not feel the need for the contribution or interference of an electronic tutor. Proposing discussions, making role plays, sharing opinions, seeing language fulfill a communicative purpose were listed as situations where students need to interact with another human being. A great number of instructors believe that activities at this stage are better done with the instructor and other students. Learning to communicate in a foreign language implies learning to negotiate meaning, understanding social behavior, observing different body language strategies, in summary, it means dealing with other people. Instructors were skeptical about the possibility of computers replacing humans in this respect.

4.2 Second Step: Designing Pedagogical Materials

Based on insights from the interviews with instructors, a sequence of activities was designed to be integrated into the practice stage of lessons. Presentations of language structures and rules are not incorporated into the system. When possible, exercises are contextualized and have a communicative content, with the expected input being based on the grammatical structures and vocabulary presented in the lesson. The context is set by a brief explanation that reflects the situation presented by the course material. The sequence of activities proposed focuses on the same situational context, and the same grammar topics in a given chapter.

TAGARELA presents six exercise types: *listening, reading, description, vocabulary, rephrasing* and *fill-in-the-blanks*. The exercises are designed to elicit students' production that vary from

very controlled practice (e.g., fill in the blanks, choice of verb forms, and short answers with vocabulary items) to less controlled practice (e.g., answering wh-questions about reading and listening passages). Those activities are meant to prepare the student for freer practice activities (e.g., problem solving, information gap activities), and production activities (e.g., role plays, discussions, conversations) to be done with the instructor or with peers.

Answers vary from single words and complete (noun or verb) phrases for the most controlled exercises to full sentences for the less controlled ones. It is never expected that students write full paragraphs or compositions. All answers are typed into the system. The form of feedback provided is based on studies by Lalande (1982), Fathman and Whalley (1990), Frantzen (1987), and Ferris (1997, 2003). According to them, corrective feedback in written assignments is beneficial to students' production. Lalande (1982), for example, argues that structured feedback raises awareness of language and reduces the occurrence of errors, in particular if it allows for self-correction[5].

4.3 Third Step: Identifying Processing Needs

In order to design a system to provide feedback messages about language forms and rules, it is important to analyze the nature of possible errors made by students. A corpus of approximately 10,000 words from written assignments of students in Portuguese 101 was collected to create a taxonomy of expected errors. Among the most common classes of errors in the corpus were *spelling* (24%), *agreement* (16%), *missing word* (12%), *extra word* (7.5%), and *word choice* (3.2%).

The most common agreement errors were between determiners and nouns, such as in (1), followed by subjects and verbs, such as in (2).

(1)   Eu vou **na**   cinema
       I   go   to the$_{fem}$ cinema$_{masc}$.

(2)   Eu   **trabalha**   no journal   e
       I$_{1persing}$ work$_{3persing}$ at the newspaper and
       eu   **fala**   francês e   inglês.
       I$_{1persing}$ speak$_{3persing}$ French and English.

Missing words pose a problem to any system that deals with ill-formed parsing. In our data the missing words range from typical functional words, like prepositions (3), to lexical heads, like main verbs (4); in the examples the missing word is shown in parentheses.

(3)   Nos come¸camos **(a)** falar com eles.
       We   started   **(to)** speak to   them.

(4)   Eu **(tenho)** muito trabalho. Tchau!   Obrigada!
       I **(have)** much work.   Good bye! Thank you!
       'I have a lot of work. Good bye! Thank you!'

Extra words were also common. The most common cases were of extra articles, such as (5), but there were also cases of extra prepositions, complementizers, and pronouns, such as the clitic 'se' in (6); in the examples the extra word is in boldface.

(5)   Vocês **os** dois sempre querem a   sobremesa.
       You   **the** two always want   the desert.
       'Both of you always want desert.'

(6)   Eu me   chamo-**se** John.
       I   myself call-**oneself** John.
       'My name is John.'

The kind of errors that have their origin in false cognates or in bad translations due to misuse of bilingual dictionaries were classified as 'word choice'. Such as the example we see in (7), where the student translated 'have a drink' literally for 'ter uma bebida' even though in Portuguese the expression is 'take a drink' (tomar uma bebida).

(7)   Eu pretendo ir   ao clube e   **ter**   uma bebida.
       I   intend   to go to the club and **have** a   drink.

The error taxonomy used by TAGARELA consists of seven general groups of errors: *non- words, subcategorization* (i.e., wrong word), *agreement, missing word, extra word, word order*, and *word choice*. Some of the error groups have sub groups. For example, *agreement* is divided into: *subject-verb* for person and number, and *adjective-noun*, *determiner-noun* and *subject-predicative* for number and gender.

4.4 Fourth Step: Developing the Technology

After gathering a clear picture of the activities to be used by the system and the types of errors the system has to handle, the next step was to explore possible NLP resources available and develop the necessary tools to handle the expected input. This section presents a summary of the architecture developed for the system. It is beyond the scope of this paper to present the details of the NLP tools used as well as the rational and motivations for choosing such tools. The reader can find more information about TAGARELA's architecture in Amaral and Meurers (2009) and Amaral (2007).

TAGARELA evaluates the student's answer by performing a sequence of comparisons among its various linguistic properties

with the linguistic properties obtained from the analyses of the target answers. This technique has the advantage of reducing the complexity of the linguistic processing to detect certain types of errors or deviations, especially the ones that are related to pragmatic and/ or semantic information. It is also useful to detect cases where there are certain types of linguistic variations in the student's input that are perfectly acceptable. Another key element in the evaluation of students' responses is the type of task the student is performing. Depending on the task, certain linguistic properties are more important than others, and some analyses could be irrelevant. The most obvious example is the unnecessary syntactic analysis of the student input in a fill-in-the-blanks activity where the target answers are always one word long. TAGARELA uses information about the activity to determine how to proceed with input processing, and to decide on which feedback message is most appropriate.

TAGARELA's architecture is made of four major modules; the Interface, the Analysis Manager, the Expert Module, and the Feedback Manager. There are also two models that provide the necessary information about activities and learners; the Learner and the Instruction models[6].

The analysis of the student input starts when the Analysis Manager receives it from the Web Interface. The Analysis Manager is responsible for deciding how to process the input and the target answers, for calling the necessary submodules of the Expert Module to provide linguistic information about the sentence, and for annotating the input with the output of those language processing sub-modules. The Expert Module is a collection of submodules that can be called to provide specific types of information about the linguistic properties of the input and of the target answers. After the input and the target answer are annotated with different types of

linguistic information, they are sent to the Feedback Manager. The Feedback Manager decides on the best feedback strategy, generates the feedback message and passes it back to the Web Interface which displays the message to the student.
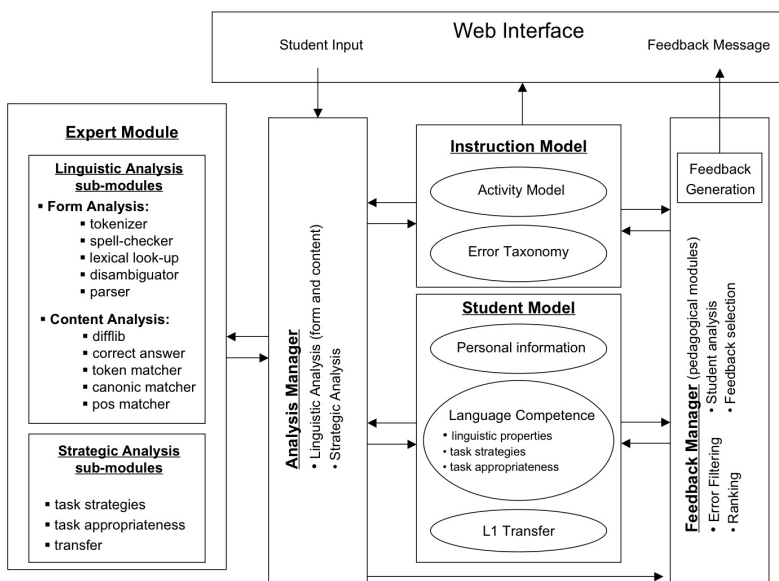

Figure 1: TAGARELA's Architecture

4.5 Advantages of Such Approach

CALL projects that combine different domains present several advantages for research and development. First, in a project where the technology is specifically developed to fulfill existing pedagogical needs, the final product has better chances of being accepted and used by CALL practitioners. If more people use the technology,

more data can be collected, opening up opportunities for different types of research. Second, everything that is learned during the development of the system provides more information about the development of technology specifically for CALL. This is different from projects that solely rely on existing software, where their findings can help us understand the usability of such technology but usually provide very little information about how to improve it in order to better help learners. Finally, as far as research is concerned, developing systems or tools for language learning provides more flexibility in terms of adapting the technology to different research contexts. In the example presented in section 4, it is possible to adapt the system's behavior to interact differently with the user. For example, if a researcher is interested in feedback types, the system can be programed to use different types of feedback messages with different groups allowing the researcher to observe the reaction of students and collect data about their learning patterns.

5. Conclusion

Because CALL is a new and multidisciplinary discipline in nature, there is among (at least some) members of the CALL community the feeling that some of the research done lacks the appropriate theoretical foundations and/or the scientific rigorousness found in other disciplines. In an attempt to build a common background, some researchers proposed to incorporate the methods used in their disciplines of choice. Although this is certainly a straightforward way to provide some coherence to the field, we cannot allow it to prevent contributions from people that share different points-of-view. Because CALL has a strong applied nature, it is particularly important to integrate practitioners into the scientific debate.

The work and opinions presented here are part of an initiative for bringing together practitioners, developers and researchers. Levy and Stockwell (2006) end their considerations about emerging and established dimensions in CALL by stating that "together (they) give a much more complete picture of current work in the field" (Levy and Stockwell, 2006, p. 251). The example presented in section 4 goes beyond this observation, since it is built on the strong convictio that CALL cannot establish itself as an independent discipline without merging these two dimensions, and that CALL research, development and integration into language learning lies with approaches that are able to integrate theory, implementation and practice in a multidisciplinary way. It is no longer enough to develop software that can be used in CALL, or to evaluate and integrate computer tools *as if* they were made to be used in CALL. CALL tools should be designed and evaluated as CALL tools. The needs of learners, the pedagogical choices of instructors, and the theoretical perspectives of researchers have to be the point of departure for CALL research and development.

Notes

1. In recent years a group of researchers in computational linguistics have been organizing workshops at different venues (mainly at CALICO, EUROCALL and ACL) trying to bring together researchers from different disciplines.

2. The fact that some electronic tutors only deal with restricted types of exercises does not necessarily mean that they do not have Artificial Intelligence components. There are tutors that only present multiple choice questions, yet have very sophisticated student models (c.f., e.g., Bull et al., 1995).

3. Error diagnosis differs from error detection because in the latter the system only needs to identify if there is an error in the sentence, while in the first the system has to provide an analysis of the nature of the error.

4. This section focuses on the procedures and motivations used to design CALL materials. See Amaral (2007) and Amaral and Meurers (2008) to learn more about the technology used in the project.

5. For more details about the theoretical background on feedback types, please refer to chapter 2 in Amaral (2007).

6. For more information about the Learner Model proposed for TAGARELA see Amaral and Meurers (2008).

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