Second Language Acquisition theories as reflected in CALL and MALL

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Abstract: This paper attempts to analyze some well-known Second Language Acquisition theories, namely the interaction hypothesis, the dual coding theory and the constructivist theory. Then, it demonstrates how these theories can be reflected in CALL and MALL, manifesting the usefulness of these two learning methods in second language learning.

Key words: Second Language Acquisition (SLA), interaction hypothesis, dual coding theory, constructivist theory, Computer Assisted Language Learning (CALL), Mobile Assisted Language Learning (MALL)

Introduction

It goes without saying that nowadays the integration of technology in learning and, specifically, in second language learning has been gaining ground. Computer Assisted Language Learning (CALL) has already been acknowledged and established to a great extent as a supportive and productive way of learning that adds to the learning process. On the other hand, no matter how controversial Mobile Assisted Language Learning (MALL) is, it undoubtedly represents so called ubiquitous learning that is not limited to any time or place, but can instead materialize anytime, anywhere. It can be claimed that the two aforementioned modern ways of learning (CALL and MALL) are grounded in certain well-known Second Language Acquisition (SLA) theories. This paper analyzes one by one the interaction hypothesis, the dual coding theory and the constructivist theory and demonstrates how these theories are reflected in CALL and MALL by making references to relevant studies, thereby displaying the potential usefulness and contribution of CALL and MALL to second language learning.

1. Interaction hypothesis

A well-known theory that is applicable to CALL and MALL, is the interaction hypothesis, proposed by Long (1996) (Ellis, 1991). It claims that second language acquisition is promoted through the interaction between non-native and native speakers or between learners of a

foreign language. In order for the interaction in question to be achieved, the participants involved in it need to have a comprehensible input at their disposal. Such an input is ensured by negotiating meaning, that is by asking for or giving clarifications so that communication is successful. Through the feedback the participants in the interaction receive, they are urged to produce or to modify language and in this way they benefit as far as language competence and production are concerned. On the one hand, less fluent speakers of the target language become acquainted with vocabulary, idioms, collocations, proverbs, structure and numerous other aspects of language that they were not aware of before, by asking for clarifications about the language they don't understand. On the other hand, more fluent speakers (e.g. native speakers) benefit too, by being "forced" to be more explicit or accurate through modifying their initial utterances. Thus, when a problem in communication occurs, interlocutors think of alternative ways to express themselves, enhancing their oral or written speech. Both parts engaged in the interaction need to frequently check if their output is comprehensible, in order to modify it if necessary. The feedback they receive determines whether they need to restructure their utterances. According to Ellis (1991), another factor that Long considers important for the effectiveness of the interaction in target language acquisition, is engagement in tasks which demand exchange of information. In addition, drawing on Pica (1987), Ellis pinpoints that it is necessary for the participants to share equal and symmetrical roles in the interaction. In this way, their interaction is promoted in a productive way, i.e. through an effective use of language that fosters successful communication.

1.1 Application of the interaction hypothesis to CALL

The interaction hypothesis has been applied to numerous CALL researches, as presented through literature. One of the studies that proves the usefulness and efficacy of the application of the interaction hypothesis to CALL, is displayed in an article included in CALICO journal entitled "The incidental development of L2 proficiency in NS-NNS email interactions." (Stockwell & Harrington, 2003). In this article the exchange of e-mails is found to promote not only authentic interaction in target language, but also target language proficiency, namely the incidental development of syntax and vocabulary in the second language. The exchange of e-mails as a way of interacting seems to encompass all the elements mentioned earlier in the article that constitute the interaction hypothesis. Through e-mails, participants in the interaction need to make meaning to each other, in other words to provide their interlocutors with comprehensible input. In order to do so, they have to modify their own output, and in this way they improve the quality of their written speech (syntax, or selection of vocabulary). E-mail exchange allows interlocutors more time to think so as to express themselves clearly, but at the same time it keeps the discussion-like mood, encountered in face to face interactions. Furthermore, the use of emails engages interlocutors in a task that involves authentic exchange of information. Participants are in a way "obliged" to respond, either by restructuring their utterances (in a more comprehensible way) or by asking for clarifications, engaging in a learning setting that is meaningful, purposeful and authentic. Last but not least,

interlocutors play equal roles in the e-mail exchange. Nobody dominates in the interaction, because nobody feels nervous or embarrassed to participate, as it usually happens in face to face interactions, especially when it comes to learners who know that they are not so fluent speakers of the target language and to the ones who are introverted by nature.

The interaction hypothesis is also reflected in an article entitled "Scenario-based spoken interaction with virtual agents" (Morton & Jack, 2005), presented in Computer Assisted Language Learning. The difference here is that the learner is involved in an oral interaction with virtual interlocutors, in other words the computer is supposed to immediately respond to the learner's oral utterances in order to provide relevant feedback This is achieved through a software which recognizes grammatical correctness of speech so as to react to uttered speech, either by modifying the initial input (in other words by restructuring it) or by repeating the learners' utterance (in other words by implicitly correcting their mistakes through providing them with a right language model to imitate). This kind of CALL approach, known as SPELL (Spoken Electronic Language Learning), places learners in a virtual reality where they need to be acquainted with the other virtual agents first and then adopt their own role in the interaction. Learners are engaged in realistic contextualized tasks, where they are expected to use a pre-determined kind of spoken interaction e.g. a dialogue taking place in a pub, in a restaurant, in a hotel etc, an idea encountered in role-plays often used in conventional classrooms. Although the dialogues produced through SPELL are not really authentic, they are situated in contexts that are inspired by real life so learners are interested in learning how to access and handle such settings by speaking. Being acquainted with contextualized language will help learners transcend from virtual environments to authentic ones and use language naturally and spontaneously. Also, participation in oral interaction (an essential prerequisite for the accomplishment of the expected interactive tasks) takes place in a stress-relieving way because learners do not feel threatened that they will be negatively criticized by their (virtual) interlocutors, although the latter seem to be more fluent speakers than they are.

1.2 Application of the interaction hypothesis to MALL

The article entitled "New forms of negotiating meaning on the move: The use of mobile-based chatting for foreign language distance learning" (Castrillo, Martín-Monje, & Bárcena, 2014), provides evidence that the interaction hypothesis can be applied to MALL. Specifically, the article describes a project in which Spanish Bachelor students attending a beginner level German learning course were engaged in a task-based social interaction as part of this project, by using the instant messaging platform of WhatsUp App., to come to a final collaborative product. The teacher occasionally intervened in the interaction, in order to propose new themes or text corrections, so his role was rather facilitative and prompting. The outcomes of this study showed that the interaction and the negotiation of meaning that were accomplished through texting were fruitful in terms of target language enhancement. By making use of their meaning negotiating skills, the learners managed to understand their interlocutors and at the same time to express themselves in a comprehensible way.

Furthermore, the accuracy of their written speech was gradually improved, by having their linguistic mistakes implicitly rather than prescriptively corrected (i.e. by receiving an indirect feedback) and by being "forced" to provide a more explicit output. It is remarkable how a familiar and ordinary application like WhatsUp, which was originally intended for mere communication and entertainment, can be transformed into a useful educational tool that promotes collaborative distance language learning through negotiation of meaning.

2. Dual coding theory

Paivio's (1971) dual coding theory (Sadoski & Paivio, 2004) is a theory of cognition that has influenced a lot the instructional design of multimedia, a basic component in CALL. It claims that cognition is achieved in two ways: through verbal associations and visual images. Information is represented both verbally and visually to the human brain and the latter processes these two types of representations of information in different ways and in separate channels, creating its own representations. These representations are perceived, organized, stored, called upon or retrieved at a later time when needed, through mental codes. According to Sadoski, Paivio and Goetz (1991), the two types of mental codes (visual and verbal) can "function independently, or in parallel, or in an integrated manner" (p. 473). This means that if somebody has to recall a concept, he can either visualize the image of it or recall the word that represents it, or simultaneously bring the image and the word of the required concept in mind. The potential to encode information both ways (visual and verbal) is believed to imprint that information in the mind better and to offer learners more chances to recall it, compared to the chances they would be given if they had just one way of encoding information at their disposal.

2.1 Application of the dual coding theory to CALL

The benefits resulting from the application of the dual coding theory to CALL are obviously manifested in an article from CALICO Journal entitled "Supporting listening comprehension and vocabulary acquisition with multimedia annotations: The students' voice" (Jones, 2003). This study describes the students' perceptions of the effectiveness of multimedia stimuli (in this case visual and verbal annotations besides the aural input) when involved in a listening comprehension task. It reveals the extent to which a multimedia learning environment which combines both verbal and visual stimuli can be motivating and beneficial to the students' better understanding of listening material and to the acquisition of vocabulary. Participants in the study were randomly subjected to one of the following treatments while engaged in a particular listening task: Listening to the expected text a)Without visual or verbal annotations b)With only verbal annotations, that is, there was a small text (a kind of explanation or definition) from which students could get some help in order to find the word they were searching for c) With only visual annotations, that is, students could view the image of the word they needed by dragging a keyword to a given camera icon d) With both verbal and

visual annotations at their disposal. In this treatment students could both be assisted by icons or/and verbal comments revealing the meaning of the pronounced word they found difficulty in coping with. Digital records were kept throughout the procedure displaying the participants' performance and then participants were interviewed to express their feelings and opinions about this listening experience. The results showed that the students displayed the best performance when offered a combination of visual and verbal annotations besides the aural text. Also, they had a mediocre performance when they were exposed exclusively either to verbal or visual annotations and finally the poorest performance when they were just able to access the requested aural text. The students' comments which best express their feelings and the benefits of the aforementioned listening experience include the following: The students who were assigned to listen without annotations at all, felt really frustrated, demotivated, disenchanted and helpless, since they kept failing to comprehend the aural input. These negative feelings almost led them to give up coping with the listening text. Those students who were offered either visual or verbal assistance apart from the aural text, found it helpful and so developed a more positive attitude towards their listening experience, compared to the previous group, that found their treatment "cruel". Yet, having to be based just on one mode (visual or verbal) besides aural, they would always miss something, since the given mode might not meet their learning style or might not be of much help at a particular moment of dealing with an unknown word. It is obvious that the students who were allowed to access annotations presented in both verbal and visual modes apart from the given aural mode, were led to a much better comprehension of the listening text and to a better short and long term recall which, in turn, led to the acquisition of the unknown vocabulary. This could be explained by the fact that the students in the last group were offered a holistic, comprehensive enactment of the input due to its multimodal nature, so they were able to construct a coherent mental representation of the listening input. Furthermore, another interesting issue that makes the difference in the last treatment is the "choice" factor (a salient element in Mayer's generative theory of multimedia learning). The participants were given the chance to select from all modes available the one (or the ones) that best met their needs and learning types in order to process the listening text in the most effective way. Therefore, this multimodal treatment of the activity caused students to have a better performance that resulted not only from the assistance that multimodality offered, but also from the positive feelings of confidence that further motivated students to deal with the task successfully.

Another effective application of the dual coding theory is displayed in an article entitled "Facilitating reading comprehension with multimedia" included in System (Chun & Plass, 1996). This article reveals the outcomes of a study which point out that representing information by making use of both visual and verbal modes –in this case through video advance organizers and annotations of separate vocabulary words- facilitate the learner's comprehension of a text. Also, as far as vocabulary is concerned, the study comes to the conclusion that "organizing information in working memory seems to be aided by learners making connections between verbal and visual systems, and this in turn helps in linking information to components of the mental model in long term memory" (p. 517). In simple

words, this means that one can more easily recall words received by using both visual and verbal stimuli.

Dual coding theory is also reflected in a study described in the article entitled "The instructive animation: Helping students build connections between words and pictures in multimedia earning" (Mayer & Anderson, 1992). The results of this study indicate that the use of animation does not help the learners understand oral instructive speech when provided separately before or after the relevant narration (of instructions). On the contrary, it is very helpful when presented concurrently with narration, as proven by the participants' performance in problem solving transfer. We infer that what makes the difference is the temporal contiguity between animation and narration, which helps the participants construct relations between visual and verbal representations of information, and thus succeed in problem solving transfer. This study reflects dual coding theory by extending previous research on the pedagogical benefits resulting from the recommended connection between words and pictures "from the domain of illustrations and text to the domain of animations and narration" (p. 452).

2.2 Application of dual coding theory to MALL

In the article entitled: "Mobile devices for language learning: Multimedia approaches" (Joseph & Uther, 2009) in Research and Practice in Technology Enhanced Learning, the dual coding theory is expressed via mobile use. Compared with its application to CALL, the application of this SLA theory to MALL excels in that it is more related to the real world, and particularly to the learners' personal, professional or social environment, because it can be applied anytime, anywhere. Through mobile cameras, learners can capture authentic material like numerous objects, animals, plants, artifacts or record events, which they can later represent to native speakers, in order to find out what the vocabulary terms are for all those visual representations, possibly resolving problems of mismatch between concepts in native and target language, especially when language fails to provide an exact translation. In addition, they can create a picture dictionary in their mobiles, consisting of words that are meaningful or interesting for them. Through PhotoStudy App., learners can e-mail attached pictures accompanied with vocabulary terms to their friends (especially native speakers) and thus achieve vocabulary acquisition through telecollaboration. Furthermore, new lists of pictures and their related verbal associations are supposed to be frequently added to a data base, so that learners can download a set of pictures and words in order to match the visual with the verbal representations. PhotoStudy has proven to be a beneficial and productive method of SLA, not only because it relates the visual and the verbal representation of vocabulary, resulting in its better retention and recall, but also because it tailors vocabulary acquisition to everyday individual experiences and needs. By learning to access language through the context where they live first, learners have a greater chance to reach language acquisition in different learning contexts, by making associations between linguistic and cultural schemata (Joseph & Uther, 2009, p18). The issue of personal construction of

knowledge within specific social and cultural settings gives implications of constructivist and social constructivist SLA theories.

3. Theory of constructivism

Constructivism (cognitive and social constructivism) is a theory of learning that has influenced the perception of teaching and learning a second language. Cognitive constructivism, mainly attributed to Piaget, claims that humans construct knowledge in their own way by relating new knowledge to their prior experiences, through the processes of assimilation and accommodation (Saul McLeod, 2009, updated 2015). During the assimilation process, humans add new experiences and knowledge to already existing ones, but they are reluctant to change their framework of perceptions so they either ignore the new information or they adjust it to fit their perception of reality in case it is incompatible with their ideas and thoughts. During the accommodation process, humans understand the importance of often reframing their own perception of reality that may lead to failure and adjusting it to external circumstances and ideas. This is when they are led to learning. Social constructivism, strongly influenced by Vygotsky's (1978) work, is an extension of cognitive constructivism which states that humans construct their own meanings and knowledge, but not independently of the social and cultural context where they belong. In other words, social constructivism accepts and welcomes individuality and uniqueness leading to the construction of knowledge, but sees the latter as embedded in the socio-cultural context through which it is achieved. As it is clearly understood, interaction and collaboration with other people (more knowledgeable people or -in the author's opinion- people who could by any way add to somebody's repertoire of knowledge and ideas), in combination with personal construction of knowledge, are the prerequisites that lead someone to reach true learning. According to Duffy and Jonassen (1992) "learners with different skills and backgrounds should collaborate in tasks and discussions to arrive at a shared understanding of the truth in a specific field". In the notion of collaboration, we find obvious implications of Vygotskian "zone of proximal development" (Shabani, Khatib, & Ebadi, 2010), that is the distance between the individual cognitive level of development and the potential development that one can reach by collaborating with peers or by receiving adult guidance.

3.1 Application of constructivist theory to CALL

The impact of constructivist theory on CALL can be easily perceived through the use of wikis as tools by means of which collaboration combined with individual creation are expressed. Wikis seem to be replicas encompassing the main concepts and principles of constructivism. Participants creatively express themselves, constructing and contributing their little pieces of wisdom, while at the same time they collaborate with other people in order to access the maximum potential of learning. In wikis, the presentation of knowledge –in our case target language acquisition-is a mosaic of different opinions, ideas, information that are constantly

reformulated through additions, reductions, substitutions and adaptations, since learning itself is an unceasingly evolving process which is always incomplete. The role of wikis as pedagogical tools promoting individual production and creation as well as interaction and collaboration, is displayed in an article entitled "Wikis and constructivism: Exploring the links" (Yates, 2008), included in *The JALT CALL Journal*. Wikis, designed with an open-editing interface, are practical to handle and allow everyone to contribute their own work, findings, ideas and information to the whole. Not unjustly, they have been characterized as collaborative in nature (Yates, 2008). Drawing on Minocha and Roberts (2008), Yates mentions that wikis enable empowerment as all students have a voice in them. In terms of second language acquisition, this tends to give learners the chance to practice the target language more willingly, because it places them in an authentic and stimulating context, where writing does not feel like homework, since it addresses a real audience. In addition, learners need to be creative and at the same time responsive to what other people have written. This implies that they have to express themselves clearly, after having carefully read and reflected on other people's thoughts and information. In sum, through the article it is clear that by participating in a wiki, learners support each other and at the same time learn from each other, being actively engaged in a knowledge-construction process.

Another article that displays the application of constructivism to CALL is the one entitled " The web as a vehicle for constructivist approaches in language teaching", by Felix (2002), included in *ReCALL*.. In this article, the internet and the Web are presented as supportive pedagogical tools that can add to the effectiveness of a conventional class setting, providing students with authentic or realistic contexts where they can be active agents of knowledge, by engaging in experiential tasks. In addition, CALL is described as pedagogically beneficial since it caters for individual differences like learning styles, cognitive levels, learning strategies and needs, and also involves students in authentic learning tasks where both the goals and the processes through which they are achieved, are stimulating. This happens because learners are expected to actively construct knowledge through goal-oriented problem-solving activities, by receiving meaningful feedback and tutor guidance, if necessary. All this learning by doing takes place in safe environments, where students are not afraid of making mistakes.

Taking all the above into consideration, we argue that there is a shift in the total perception of teaching and learning a second language. Teaching is no longer a sterile transmission of knowledge, based on traditional cognitive learning theories. On the other hand, learning is now characterized by student centeredness and active participation on the part of the learner in the construction of knowledge, as constructivism dictates. Although the internet will always allocate a place to controlled language exercises such as drills, lockstep structures with immediate feedback e.t.c., -since the importance of linguistic accuracy cannot be ignored- authentic, meaningful, contextualized and interactive tasks such as collaborative writing, are increasingly gaining ground. The internet and the Web seem to be the best tools in the design of activities that promote creation, interaction and connectivity. Activities as such can be

information gap resolution tasks (like simulations, contextualized emails exchanges, mystery games as well as text and voice chats) and experiential learning activities (like collaborative writing, magazines, portfolios, virtual reality placed activities e.t.c.) (Felix, 2002).

On the whole, as it is revealed by the article, CALL embeds numerous promising pedagogigal benefits, as long as instructors cater for the design/preparation of meaningful, creative and interactive tasks that are intended to promote students' target language acquisition integrated into social interaction skills, in other words tasks that are expected to prepare students to face the challenges of the real world (Felix, 2002).

Social constructivist principles are fully reflected in *Digital Literacies in Foreign and Second Language Education, CALICO Monogragh Series*, Volume 12. As many authors of this series pinpoint, language learning can no longer be imprisoned in a classroom setting, but it is inextricably linked to the socio-cultural context where it takes place and, thus, has to abide by the socio-cultural demands that this context dictates. According to Swaffar and Arens (2005), the radical changes throughout the past few decades "reflect an understanding of literacy as socially bounded and contextual, no longer accessible solely through command of language as traditionally presented in many [foreign language] classrooms"(p. 3). It seems that there is a shift in the perception of what literacy is. The knowledge of the four language skills (reading, writing, listening and speaking) is no longer adequate. As Buckingham (2008) argues, "we need a much broader reconceptualization of what we mean by literacy in a world that is increasingly dominated by electronic media" (p. 88). In such a world where digital and multimodal literacies seem to play a pivotal role, learners cannot construct knowledge disregarding these novel technology-mediated ways of meaning making, if they are to be considered literate. It is comprehensible that in a digital era where new digital tools and new types of communication spaces have overwhelmed our lives, there is a need to re-determine language learning and teaching in order to make them compatible with the setting to which they belong.

Lotherington and Ronda (2014) challenge the existing concept of communicative competence and reconceptualize the framework that defines it by proposing four dimensions that constitute competence: "multimedia, collaborative communication, agentive participation and multitasking". Through multimedia, humans seem to transcend their physical dimension via the exploitation of all modalities available such as sound, visual, still and moving images or videos. In a digital era humans are expected to construct meaning by handling digital settings and making the best use of every mode and potentiality that these settings allow. As it is clearly understood, the construction of meaning cannot be seen detached from today's socio-cultural context (social constructivist view). Concerning agentive participation, in such a digital context where knowledge can be so easily accessed and disseminated, authorship is no longer a privilege of just a few people. Everyone can be an agent and an active participant in the construction of knowledge in many ways, namely through wikis, blogs, social media, sites, forums etc. This comprise (tele)collaborative (language) learning, is increasingly prevailing, being considered pedagogically advantageous due to its authentic, interactive

and/or intercultural nature. Coming to the fourth aforementioned element that is believed to compose today's notion of competence, in order for someone to become digitally competent, they have to develop multitasking mastery, that is the dexterity to successfully navigate complex multimodal media and platforms that promote interaction.

3.2 Application of constructivist theory to MALL

Constructivist SLA principles are thoroughly reflected in the article "Mobile blogs in language learning: Making the most of informal and situated learning opportunities" (Comas-Quinn, Mardomingo, & Valentine, 2009) in *ReCALL*. This article describes how mobile blogging can function as a beneficial pedagogical tool promoting constructivist approaches to SLA. These approaches are related to active participation in the construction and delivery of knowledge, promotion of collaboration and sense of community, as well as situated learning and exchange of intercultural and personal experiences in an informal and natural learning context. Through mobiles, learners are able to capture anything of interest for them anytime, anywhere. Then, they can share it by instantly posting it in a blog through their mobiles, reflect on it by writing a comment and have their e-friends reflect on it too, by providing their own comments under uploaded pictures or videos in the blog. In this way, target language is acquired through interaction in an absolutely authentic, informal and natural way. This way of learning is stimulating and at the same time meets the demands of real life.

Conclusion

As we can realize through the CALL and the MALL literature, the three SLA theories analyzed in the articles as encompassing their own points of importance for the learning process, are reflected in CALL and MALL. This fact reveals how advantageous the role of computers and mobiles has proven to be in acquiring a second language. After CALL research has already manifested the significant contribution of computers to second language acquisition, it is notable that mobiles have started to gain ground in being acknowledged as a pedagogical tool that can aid in this direction. Since learning is a constantly evolving process, it would be a pity to be restricted by time or place. Therefore, perhaps it is worth giving mobiles the chance to allow us to access knowledge in any context we happen to be. Openness, together with carefully designed mobile-based tasks abiding by pedagogical principles, will be able to make mobiles a supportive pedagogical tool aiding in targeting second language acquisition.

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