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Beyond interaction: the study of collaborative activity in computer-mediated tasks

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Abstract

Research, design, implementation, and evaluation of CALL materials needs to be based on sound SLA theories and research. A research agenda of CALL issues needs to be identified and investigated by means of suitable methodology. I propose that a Sociocultural approach to language learning provides a useful theoretical framework to investigate the process of collaborative activity in computer-mediated tasks. Following a brief overview of Sociocultural theory in relation to its claims about the usefulness of collaborative activity in the language classroom, I provide an account of issues to be addressed in task design. Finally, I exemplify from a study currently taking place how collaborative activity in computer-mediated tasks can be empirically studied, and I outline some of the methodological considerations underpinning such research work.

1 Introduction

Although computers in the foreign language environment have been present for about four decades, we are just beginning to appreciate and understand some of the implications that the computer embodies, and it is essential that we work towards a serious analysis of potential beyond the realms of novelty and practicality. Collaboration among second language teachers, software designers, and researchers, implies a cyclical process of constant research, design, implementation, and evaluation of Computer-Assisted Language Learning (CALL) materials. This process should have its conceptual roots in sound second language acquisition theories and research, and should eventually also throw light upon those theories in order to gain a deeper understanding of language, its acquisition, and how language learning can be optimised in the classroom.

The aim of this paper is to provide a blueprint as to how we can implement and empirically investigate computer-based tasks in the second language classroom from a Sociocultural perspective. Firstly, we provide an overview of the theoretical framework. Secondly, we describe an investigation of dyadic (pair) collaboration at the computer. Thirdly, we provide a reflection on some of the methodological considerations that such research work entails.

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2 The sociocultural approach to language learning

A fundamental premise in the Sociocultural approach to language learning is the notion of knowledge being social and created in interaction. According to Vygotsky, cognitive development appears first in the inter-psychological plane and it is then appropriated by the individual, internalised in the intra-psychological plane (see Vygotsky, 1978). The processes undergone in inter-psychological activity are mediated by tools, either physical and/or symbolic, language being the most pervasive of these. *Mediated activity* can then be understood as "the relationship between the use of signs and the use of tools" (Robbins, 2001: 33)

Social interaction is a means to achieve language development that enables internalisation "through a dynamic transformative process called microgenesis" (Wertsch, 1985a in Ohta, 2000: 54). This learning process we are referring to as microgenesis can sometimes be observed while learners engage in dialogic communication, and can thus be studied within the situated activity in which it occurs.

2.1 Beyond interaction: collaborative dialogue

Interaction as embodied by the Vygotskian concept of inter-psychological activity is fundamentally different from the concept of interaction portrayed by the 'conduit metaphor' in which messages are created intra-mentally and then transmitted to the interlocutor for decoding in order to achieve the goal of communication (cf. Thorne, 2000:227). Interaction from a Sociocultural perspective is an enabling process that becomes essential for individuals to achieve development. By engaging in inter-psychological activity, participants are able to co-construct knowledge as well as create meaning. These conceptual differences can be observed in theoretical perspectives on second language acquisition and what they consider the benefits of interaction are in the language process.

Following Krashen's Input Hypothesis (1982,1985), researchers like Long (1985), Long & Crookes (1993), and Pica (1994) have studied interaction as an enabling activity to provide learners with opportunities for negotiation of meaning. The ultimate goal of negotiation of meaning in communicative interaction is seen as the modification of input into 'comprehensible input'. From an Interactionist perspective, breakdowns in communication are seen as potential opportunities for participants to negotiate their linguistic production in order to re-establish that communication and this process is seen as driving development of the system. However, it has been noted that learners are often able to overcome their communication problems without necessarily negotiating for meaning (Skehan & Foster, 2001:187). Furthermore, researchers from this theoretical perspective have failed so far to provide convincing evidence that there might indeed be a link between negotiation for meaning and second language acquisition (cf. Swain, 2000:98 and Skehan & Foster, 2001).

Throughout her vast experience with French immersion education programmes in Canadian schools, Swain (1985) became convinced that the assumption, following Krashen's Input Hypothesis, that providing learners with comprehensible input should be a sufficient condition for the acquisition of the target language, was not entirely accurate. Students who had been under the programme for up to seven years and therefore

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exposed to an environment rich in comprehensible input, showed that "their grammatical performance (was) not equivalent to that of native speakers." (1985: 252). These observations directed her attention to the study of output, and eventually, to the formulation of her 'comprehensible output' hypothesis.

Swain argues that having to produce the target language helps learners in three main ways. First of all, by being "pushed to stretch their interlanguage" (cf. Swain, 1997:117), learners might notice discrepancies between their output and the target language. This is an opportunity for them to focus on form and, importantly, to focus on those aspects of their interlanguage which they regard as important to achieve their own goals. Secondly, the production of output can serve as the basis for hypothesis testing, "it has been argued that some errors which appear in learners' written and spoken production reveal hypotheses held by them about how the target language works. To test a hypothesis, learners need to do something and one way of doing this is to say or write something." (Swain: 1995:130–131). Finally, output, according to Swain, can have a metalinguistic function by allowing learners to reflect and talk about their language.

From a Sociocultural perspective, the cognitive processes involved in the production of output that might lead to language development are first realised in the inter-mental plane and then internalised. It is through and by means of dialogue that noticing, hypothesis testing, and reflective metalinguistic talk can occur (Swain, 1997). However, not all dialogue is equally conducive to cognitive and linguistic development. Outside the area of CALL, researchers like Donato, 1994; Swain, 1997; Swain & Lapkin, 2001; and Roschelle & Teasley, 1995 have identified collaborative dialogue that emerges from learners' interactions when engaged in problem-solving activity as the kind of interaction that can potentially lead to the co-construction of linguistic development. In Swain's words, *collaborative dialogue* "is where language use and language learning can co-occur. It is language use mediating language learning. It is cognitive activity and social activity" (Swain, 2000:97). How can we then, as researchers and teachers, identify and provide tasks that would allow learners to engage in dialogic communication that mediates collaborative activity and that would, hopefully, lead to language learning? And can CALL enrich this process?

3 CALL tasks and the processes of collaborative activity

3.1 General features of collaborative tasks

There is a clear lack of studies in the area of CALL that concentrate on determining what task characteristics and features contribute to learners' interaction either with other learners while working at the computer or learner-computer interaction as such. Researchers into CALL have been interested in specific task features and their effectiveness for promoting vocabulary acquisition, for instance, the study of different kinds of glosses, e.g. video glosses *versus* static picture glosses (Al-Seghayer, 2001) or the use of glosses for vocabulary acquisition through 'noticing' (Chapelle, 1998, Hegelheimer & Chapelle, 2000). Research has also been carried out to study general issues of reading comprehension (Plass, 1998 and Chun & Plass, 1996) and the power of hypertext (Anderson, Mayes & Kibby, 1995). However, the specificity of computer-based tasks as mediational tools for collaborative activity in the language classroom is an area that

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needs to be systematically studied.

It is necessary to identify tasks that can serve as blueprints for learners to engage in meaningful activity in pursuit of a goal. The activity generated by the learners' interaction with the task is a unique event since it is defined by the processes that develop as a result of that interaction in combination with the learners' own goals and perceptions of the task (Coughlan & Duff, 1994). In other words, we need to study tasks as generic events that will provide opportunities for unique activity that could lead to the co-construction of knowledge in the classroom. By studying the processes that result from a task and the activity it promotes we should find ourselves, as teachers, researchers, and materials designers, in a better position to design, implement, and use tasks that will promote fruitful collaboration in the language classroom.

Tasks can be defined and constructed taking into account a series of characteristics that will provide the basis for the kind of learners' activity which is believed to promote language learning, e.g. collaboration, negotiation of meaning, and problem-solving endeavours among others. Although task characteristics co-exist and are interwoven as a holistic unit, for the purposes of design, analysis, and evaluation of task-based activity, it is possible and indeed desirable to see these characteristics as discrete elements that can be grouped in terms of their structural, cognitive/metacognitive, and sociocognitive features. This kind of analysis is necessary both for task design and for prediction and evaluation of linguistic outcomes and processes of learners' interactions when performing tasks.

A. Structural characteristics can be determined by (1) the nature of the task itself, (2) the degree of structure embedded in the task, and (3) the focus of the task. The nature of the task depends on the specific type of task it is, for example, a problem-solving assignment or a more mechanical exercise. For instance, a problem-solving task might be an essentially cognitive problem such as picture-sequences, e.g. "the wolf, the goat, and the cabbage" (see Ur, 1981:62), or a linguistic reconstruction like a puzzle, a cloze, or jumbled words or sentences. The degree of structure embedded in the task can be relatively simple if task completion requires a linear pursuit, or more complex when, in order to achieve a goal, it is necessary for learners to work on subtasks as part of a more global event. This would be the case for an information gap exercise where learners need to request information from each other to then write together an account of a whole narrative that contains the gathered information. Finally, focus and structure are closely interdependent. A well-designed task should make use of structural patterns to help learners concentrate on meaningful interaction, language form or both depending on activity purpose and learners' needs.

B. Task goals and purpose as perceived by the task designer can be explicitly stated or implicitly embedded in the task; either way, however, learners must be given a clear idea as to what the task outcomes entail so that they can plan and/or proceed with its completion. Cognitive considerations embrace issues like learners' familiarity with the task content and information, the kind of decisions they need to make to achieve a goal, whether or not those decisions can be reached individually or collectively, and whether task content and information need to be

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transformed, reproduced, or reinterpreted (Skehan, 2001:173).

C. Sociocognitive characteristics determine the learners' roles in task completion, and the kind of interaction required. Ellis (2001) classifies tasks as 'reciprocal' or 'non-reciprocal' based on their information flow. Speaking tasks are typically reciprocal requiring a two-way flow of information between speaker and listener, whereas a listening task, for instance, is of a non-reciprocal nature, requiring only a one-way information flow. Normally, the classification of tasks as reciprocal and non-reciprocal works as a continuum rather than a fixed typology (Ellis, 2001:49). Sociocognitive demands can be eased and aided by means of contextual support. Tasks, according to Mohan (1992:121), can be 'context-reduced' or 'context-embedded' depending on the discourse support they provide. A context-reduced task might depend more on linguistic cues and patterns for their completion, and would often be tasks that focus on form rather than meaning, whereas context-embedded tasks would rely more strongly on situational cues that would help learners negotiate for meaning and give feedback to each other. From a Communicative Language Teaching perspective, context-embedded tasks are perceived to be more authentic, imitating naturalistic interaction that could potentially facilitate transfer from classroom activity to real world interaction. However, level of task authenticity can be determined by learners' needs and their own perception of those needs; working on grammar, for instance, is perceived as an authentic task for many students (Egbert & Jessup, 1996). Finally, the way learners themselves perceive the purpose and goals of a particular task might affect the pattern of interaction and the way in which activity is conducted throughout task completion.

3.2 Using computers to support collaborative tasks

The dimension added by the computer in computer-mediated tasks needs to be carefully studied in task design and evaluation. The role of the computer can be analysed within the three parameters described above: structural, cognitive, and sociocognitive. However, whereas the structural and cognitive characteristics are mostly in-built and pre-designed in the computer-mediated task, the role of the computer in terms of the sociocognitive aspect becomes a more subjective matter. The computer has a dual role, it is the provider of a space for interaction, a mediator, and it is also a participant in that interaction. The way in which learners perceive the role of the computer, make use of it, and incorporate it into their social context cannot be fully described until learners are performing or have performed the task.

3.3 Task difficulty and task implementation

According to Skehan (2001:173) task difficulty can be evaluated in terms of: familiarity of information, the degree to which learners have to assimilate new information in order to complete the task; whether the task is of a dialogic or monologic nature, that is the kind of interaction required; the degree of structure, number of structural levels in the task, plus time sequence, whether the task is organised chronologically or not; complex-

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Table 1. *Research questions and instruments.*

Research instruments	Research questions addressed	Data analysis processes
Tasks	*Degree* of support for collaborative work: Evidence of collaboration Relationship between tasks and collaboration Evidence and degree of microgenesis *Relationship* between collaboration and microgenesis *Specificity* and role of the computer throughout the processes of task completion.	*Discourse analysis* of transcribed audio or/and video-taped protocols of participants accomplishing tasks *Quantitative & qualitative* analyses of Collaborative Episodes (CEs), Language Related Episodes (LREs) & Microgenetic Episodes (MGEs) (see Analytical Procedures below) *Quantitative & qualitative* comparisons of: a) different tasks b) two modes of implementation: CALL tasks versus non-CALL tasks (paper tasks)
Post-task questionnaires	*How* do participants perceive the quality of collaboration? *What* are the learning outcomes as perceived by participants?	*Quantitative & qualitative* analyses of questionnaires to assess participants' perceptions of collaboration & learning in the different tasks

ity of outcomes, the kind of decisions that need to be made for completion and whether or not those decisions can be reached individually; and transformation, whether or not the received information will be transformed throughout the task.

In terms of computer-mediated task design and implementation, Hubbard (1992) suggests that designers of language teaching software should take into account the same kind of considerations that apply to designing language teaching methods in general. These considerations are outlined in terms of Approach, Design, and Procedure. Approach refers to the method's assumptions as to what the nature of language and language learning is; Design involves the conceptualisation of those assumptions in terms of tasks and procedures; and Procedure refers to the actual implementation of specific tasks, taking into account the type of task it is, how it will be presented on the screen, human-computer interface, the kind of feedback offered to the learner, help options, and control options, among others. Hubbard advocates task implementation that is based on and consistent with sound theoretical assumptions about language learning and which is designed for a particular audience, with particular learning objectives (1992: 62). Hegelheimer & Chapelle (2000: 42) have also urged researchers to engage in the kind of

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investigation that follows a cyclical relationship between SLA theory, CALL materials, and empirical research. This implies the development and implementation of CALL materials based upon sound theoretical frameworks, and whose empirical study will, eventually, throw light upon SLA theory, fulfilling in this way a necessary cycle that will inform us about both language learning materials and SLA assumptions. What follows in this paper is an attempt to exemplify how we can pursue this kind of research in the study of collaborative activity in computer-mediated tasks by outlining the methodology underlying an ongoing empirical study of university students learning Spanish as a foreign language (Gánem-Gutiérrez in progress).

4 Investigating collaborative dialogue in CALL tasks

Dyadic collaboration (i.e. working in pairs) during completion of computer-assisted tasks is the core issue of the illustrative research design described in this section. This provides an observational focus that has the potential to provide valuable information related to some of the mechanisms and relationships that take place in computer-assisted classroom situations. Collaborative activity is seen, from a Sociocultural perspective, as a facilitator for learning which promotes the dialogic inter-mental relationships considered to be important for target language internalisation. The role of the computer as a mediating tool in the processes of collaborative activity is of central importance in the research. So, we can summarise the three foci of the study as:

a. collaborative activity in CALL tasks;
b. the potential of collaborative activity as a facilitator for language learning; and
c. the role of the computer as a mediational tool during the processes of collaborative activity.

These research foci have been operationalised as Table 1 illustrates.

4.1 Methodological considerations

The intrinsically social nature and complexity of dyadic collaborative activity at the computer, plus the expectations of activity theory, requires the recording, description, and analysis of different pieces of information that can be obtained by means of various instruments. Before embarking on a holistic study of this kind it is necessary to learn about the learners' knowledge and attitudes towards collaboration and the computer, for example. This sort of information can be obtained by means of a questionnaire like the one designed by Warschauer (1996). It is also desirable to implement linguistic tests pre and post CALL task implementation that would inform us about changes in the learners' interlanguage. The complete study discussed here included both these steps (Gánem-Gutiérrez, in progress). However, for the purposes of the present paper, we are going to focus on the CALL task as our main instrument to gather information about the three issues identified above.

Because we are interested in studying learning processes as they take place during inter-mental activity, an in-depth qualitative methodology is considered to be the most appropriate, from a Sociocultural approach "L2 acquisition...is not considered to be

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wholly resident in the mind of the language learner, such that it can only be inferentially accessed by the researcher...” (Ohta, 2000: 51). Therefore, it is necessary to record the learners’ interaction while they accomplish appropriate tasks to observe some aspects of the learning process. Problem-solving tasks that present learners with ‘obstacles’ are believed to allow the researcher “to observe how changes (i.e. development) occur as a result of the interference.” (Roebuck, 2000: 85).

Social interaction is profoundly influenced by the context and specific circumstances in which it takes place. A qualitative study has a twofold potentiality indispensable for the understanding of the kind of interactions we are interested in. On the one hand, by recognizing “the complexity and ‘embeddedness’ of social truths,” (Cohen, Manion & Morrison, 2001:184) this style of inquiry lends itself to the integration and consideration of the different levels that permeate activity when viewed from a Sociocultural perspective. On the other hand, this kind of study empowers the researcher with the capabilities to observe social interaction over a period of time thus providing the opportunity to observe and analyse the participants and their interactions throughout the dynamic, evolving process that takes place in the language classroom. Although this kind of work has been pursued outside the area of CALL by researchers like Donato, 1994; Swain, 1998; Swain & Lapkin, 2001; Crook, 1994, “in the study of CALL...only a few studies have attempted to document the nature of the linguistic exchanges that learners participate in...and fewer have attempted systematic hypotheses about the value of the language of a CALL activity.” (Chapelle, 1997: 22). The CALL tasks described below for the purpose of illustration of this kind of empirical pursuit are then both the foci and the instrument for study, matter and tool.

4.2 The tasks

The three CALL tasks described in this section are meant to exemplify the kind of tasks that can be used as instruments for research to provide a teacher-researcher with a window for the observation and study of collaborative activity in computer-mediated

Resuelvan el problema: **Hermanas Dotadas**

Cuatro hermanas, hijas de un diplomático canadiense, tienen talentos musicales y también hablan cuatro idiomas europeos (uno de ellos es el **italiano**). Cada una toca un instrumento musical diferente (los cuatro instrumentos son **el clarinete**, **la flauta**, **el piano** y **el violín)** y cada una habla un idioma diferente.

Para resolver el problema y completar el cuadro, necesitan **JUNTOS(AS)** obtener **CINCO** oraciones que les darán todas las claves necesarias. ¿Cómo obtener las oraciones? Bueno, pues deben **COLABORAR** como **pareja**, y **SIEMPRE** hablando **español**, en los ejercicios que tienen en la computadora. Cada vez que completen CORRECTAMENTE los ejercicios, obtendrán una oración. Si ponen atención a los ejercicios, también ahí obtendrán algunas pistas. Pueden copiar en esta hoja las claves que vayan obteniendo para que al final tengan toda la información junta.

!Ahora a la computadora!

NOMBRE	INSTRUMENTO	IDIOMA
Elisa		
Rita		
Ana		
Tere		

Fig. 1. Gifted Sisters.

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tasks. In our study these tasks have also been adapted for completion without using the computer and will be referred to as 'Paper' tasks. It is proposed that comparative analyses of the two modes of implementation will provide information in relation to the specificity of the computer as a mediational tool in the processes of collaboration.

4.2.1 Task 1 "Professionals today"

The first task is called "Professionals Today" and consists of three parts: (1) a discussion about the world of work; (2) an interview reconstruction; and (3) a document creation. In preparation for the content of the task, in the first section participants are given a list of concepts like status, intellectual development, etc. to discuss and negotiate what they consider more and less important in the world of work so that they can organize them hierarchically, according to their personal opinion. This can be executed as a 'drag and drop' exercise. Then they discuss some of the qualities they consider important in terms of human relationships and complete two sentences that express their thoughts. The sentences need to be elaborated in such a way that each participant is expected to complete a sentence about their partner. The second and core stage of the task is an interview reconstruction. A Spanish professional is interviewed about some of his views of the world of work and relationships and participants are expected to collaborate in order to reconstruct the dialogue. Finally, as a post-task for participants who finish the first two stages before their classmates, they can be asked to use a word processor to write a paragraph that expresses their own views about the topic, but in the context of the UK for example.

Feedback and help from the computer can be provided in various degrees and different ways by means of clues, hints, and correction buttons. The amount and kind of help available throughout the task needs to be carefully considered so that learners are encouraged to collaborate and try to get help from each other before resorting to the machine.

The goals of this task are on the one hand, to provide a space for participants to discuss the topic and explore some related issues by collaborating to reach common agreements as well as express their own thoughts and, on the other hand, to focus on form in a contextualised way. Inter-mental activity is expected to take place in relation to communication for meaning, metalinguistic work, and metacognitive activity.

This task can be adapted for paper mode by reproducing it by means of a word processor. Each pair is given only one copy of the task so that they can also focus on the one hardcopy, just as their CALL task counterparts will focus on the one monitor. Feedback and help can be provided by the teacher-researcher when requested and learners can be given the printed whole interview when they finish the reconstruction process for them to check their answers and discuss the outcome.

4.2.2 Task 2, "Gifted sisters"

Task number two is a traditional problem-solving task where participants are given linguistic clues that will help them solve the cognitive problem posited. This task can be described as a variation on a trail quiz that consists of a macro-task: finding out which language and which musical instrument belongs to which of five sisters so that they can

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Table 2 *Summary of the tasks as a tool for data collection*

Task	Procedure	Goals	Expected inter-mental activity	Programme type
1. Professionals today.	1. Discussion (aided by computer) about the world of work and relationships.	To focus on form.	Communication for meaning.	Authoring Software e.g. HotPotatoes by Half-Baked
	2. Cloze exercise to complete interview with a Spanish professional about his perceptions of work and relationships.	To discuss and express their views on the task topics	Metalinguistic work	Partial-deletion program
	3. Creation of a document to express students' own views towards either professional life in Spain, taking into account the views in the interview, or work life in the UK.	To create a document in order to synthesise their discussion.	Metacognitive activity (e.g. planning)	Webpage generator e.g. GoLive by Adobe or Dreamweaver by Macromedia.
2.Problem-solving task: variation on a trail quiz.	Students have to solve a problem by collecting the necessary information (5 pieces). Each piece of information is provided to them by the computer when they successfully complete a linguistic task.	To solve a problem. To focus on form.	Metacognitive talk leading to the solution of the problem (e.g. planning, and negotiation) Metalinguistic talk.	Authoring program e.g. HotPotatoes to produce cloze, translation, matching and jumbled sentence micro-tasks. Webpage generator e.g. GoLive by Adobe or Dreamweaver by Macromedia.

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Table 2. *Summary of the tasks as a tool for data collection CONT'D*

Task	Procedure	Goals	Expected inter-mental activity	Programme type
3. Text re-construction, a variation on Dictogloss	1. Students read a short text on the screen that will disappear after 60 seconds. (They have two opportunities to read the text.) 2. Students collaborate on the reconstructionof the text, following the format of a cloze. 3. Students write together a similar text, but this time about their personal experience,using a word processor.	To focus on form by reconstructing a text. To create a document that will reflect their personal perceptions about a topic. To negotiate the kind of information to be included in their text.	Metacognitive talk: planning how to tackle the task. Metalinguistic talk Communication for meaning.	Authoring program e.g. HotPotatoes. Webpage generator e.g. GoLive by Adobe or Dreamweaver by Macromedia.

fill in the table provided to them on paper (Figure 1), and five embedded micro-tasks that focus on form. In other words, the pairs have to solve a problem by collecting the necessary five pieces of information. Each piece of information is provided to them by the computer after successfully completing a micro-task based on grammar. These micro-tasks can follow formats such as gap filling, translations, drag and drop, jumbled sentences, matching, etc.

Metacognitive talk is expected to take place between the participants (inter-mental activity) as part of the necessary planning, negotiation, organising, etc. required to solve the problem of the macro-task. This task is also expected to bring about metalinguistic talk by means of the micro-tasks in terms of the grammatical focus in-built in them. Participants are free to decide how they want to tackle the problem-solving task; they can either collect all the clues and then collaborate to fill in the chart or they can try and work out the solution of the problem with the information available every time they obtain a clue.

Computer feedback can consist of letter hints in some of the micro-tasks and a correction button that works in the same way as in the previous task; after pressing it, correct answers become integrated in the text, but marked in bold typeface whereas incorrect answers are erased so that learners have the opportunity to continue working on them.

In the paper version of this task, the teacher-researcher needs to provide the information given by the computer in the CALL version of the task. Participants are given the five clues and micro-tasks gradually after successfully accomplishing each stage. The teacher-researcher provides feedback when requested and also checks each micro-task when pairs finish and encourage them to continue working on incorrect output so that participants have a similar opportunity to pairs working on the CALL version. As with the previous task, each pair gets only one set of the paper task to encourage them to collaborate and become involved in inter-mental activity.

4.2.3 Task 3, "Dictogloss"

Finally, the third task is an adaptation of "dictogloss" (Kowal & Swain, 1997: 295 and Swain & Lapkin, 2001:101) which is described as "...a procedure that encourages students to reflect on their own output. In this procedure, a short, dense text is read to the learners at normal speed; while it is being read, students jot down familiar words and phrases; the learners work together in small groups to reconstruct the text from their shared resources..." (Kowal & Swain, 1997). In the CALL version of dictogloss participants read a text provided on the right hand side of the computer screen instead of listening to it. They cannot typewrite while the text is on the screen. Participants have a minute to read the text and after that the text disappears from the screen, though they can read the text twice. When learners are ready to read the text a second time they only have to press a button for it to reappear for the second time. Feedback can be provided in the same way as described in the previous two CALL tasks. The text can be designed for learners to focus on any required structures of the target language. Inter-mental activity is expected to produce both metacognitive and metalinguistic talk. Learners who finish early can be encouraged to use a word processor to create a similar text about their own experience.

The paper version of this task consists of three pages: one with the instructions,

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Table 3. *An example of a collaborative episode*

Notes on transcription conventions:
1. to preserve anonymity, the names in the example are fictitious.
2. (.) means very short pause
3. (( )) indicates comments
4. "c o m" indicates spelling out

153	**Pat**	**si (.) acaba**
154	John	de comprar
155	**Pat**	**de c o m (.) prar**
156	John	lo lo ya está acaba de comprarlo ((pause)) ya first time! ((he starts reading next clue))

another one with the text, and a third one with the title of the text and blanks for learners to reconstruct the text; as in the CALL version. Learners are requested to read the text only twice and not to write while looking at the text. Feedback is provided by the teacher-researcher on request. As in the previous tasks, pairs should be given only one set of paper to work on in order to encourage collaborative work.

Table 4. *(a) An example of a microgenetic episode from the author's material, (b) as (a), but translated into English*

Notes on transcription:
1: = indicated latching: when one person starts speking immediately after another has finished.
2: [indicated overlapping

129	Tim	pero continuó (.) es el,
130	Sue	no s no estoy seguro (.) continuo=
131	Tim	=gerundio
132	Sue	=a leer?
133	Tim	después de [continuar
134	Sue	[continuar (.) leyendo (.) leer leyendo leyendo?
135	Tim	si es leyendo porque es el gerundio (.) después de seguir y continuar
136	Sue	l e y e n d o, punto ((said slowly while typing)) ((they press button to check))
129	Tim	but he continued (.) it is,
130	Sue	I'm not sure (.) he continued=
131	Tim	=gerund
132	Sue	=to read?
133	Tim	after [to continue
134	Sue	[to continue (.) reading (.) to read reading reading?
135	Tim	yes it is reading because it is the gerund (.) after to go on and to continue
136	Sue	reading full stop ((said slowly while typing)) ((they press button to check))

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These three tasks provide the students with a twofold and explicit general objective. On the one hand, students have the specific aim of completing the problem solving phase of the task, and on the other hand, they will be able to focus on form by working on the grammatical structures that are part of the micro-tasks embedded in the task. Research protocols are generated by the recording and transcription of students' interaction while carrying out the tasks. The analysis of the students' protocols while collaborating in the completion of the tasks will then, inform us on the procedures and interactions followed by students to complete the tasks; and crucially, this kind of data has the potential of providing information on how inter-mental activity might lead to microgenesis of new language forms, these tasks are shown in Table 2.

4.3 Procedures for data collection

In this ongoing study the participants were 26 females and 8 males in their late teens/early twenties (with two exceptions, one aged 32 and another 40). Their level of Spanish corresponds to a grade C in 'A' level Spanish, the national qualification within the British Education context taken at the end of secondary schooling. For each of the tasks, participants were divided into two groups. Half of the pairs accomplished a CALL task and half a paper task. Everybody was given the opportunity to work alternately between the two modes throughout the three tasks. In other words, participants who worked on CALL mode in task 1 were then asked to work on paper mode in task 2 and so on. All pairs were audio or video-taped while completing the tasks.

4.4 Analytical procedures

The first research question is concerned with the degree to which different tasks support collaborative work in the classroom. This is, collaboration where participants are involved in co-creating common ground to share their understandings and knowledge; where participants are mutually engaged in creating a common space through the incorporation of their individual insights and mediational tools in order to discuss, make decisions, manage conflict, and, hopefully, gain self-regulation through inter-mental activity (cf. Crook, 1994). From the Sociocultural theoretical perspective being explored throughout this paper, peer collaboration is seen as an enhancing opportunity for negotiation, scaffolding, and ultimately, microgenesis – "the local, contextualized learning process" that can sometimes be traced visibly during interaction (cf. Mitchell & Myles, 1998: 147–148). Therefore, increased collaboration would be considered as positive. Since one of the objectives of our study is to gain a better understanding of the kind of computer-tasks that might promote higher levels of collaboration and high quality collaboration in terms of microgenetic activity opportunities, the different tasks and some of their specific features must be compared and analysed. The second research focus relates to the instances of microgenesis identified throughout task completion; once again higher levels of microgenetic activity would be seen as positive. Finally, our third research focus aims at providing information as to the relationship between instances of microgenesis and the specificity of computer-based tasks. Data comparisons of computer-based tasks and paper-based tasks need to be described and evaluated to ascertain degrees of benefit of one mode over the other.

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In order to address the first research focus, the transcribed data will be examined to identify and count the number of Collaborative Episodes (CEs) produced by pairs in each of the different tasks in their two modes of implementation (computer-based and paper-based). Quantitative analysis can be carried out to assess significant factors in the comparison. Qualitative description and evaluation procedures will be utilised to examine the protocols for relationships between tasks and task features (e.g. availability of immediate feedback) and occurrence of Collaborative Episodes. Table 3 is an example of a Collaborative Episode from the author's data which illustrates how two learners collaborate to translate the sentence "She's just bought it" into Spanish.

To address the issue of microgenetic activity raised in the second research focus, the transcribed data can be examined for instances of Language Related Episodes (LREs) defined by Swain and Lapkin as "any part of a dialogue where students talk about language they are producing, question their language use, or other – or self-correct their language production" (2001:104) and Microgenetic Episodes (MGEs), episodes in which a learning process can be observed, like the one in the example below. These episodes can be counted and comparisons between the different tasks and modes of implementation developed as for research focus one. Tables 4a and 4b is an example of a Microgenetic Episode from the author's data:

These tables illustrate how Tim in this particular instance provides the necessary scaffolding for his classmate to modify the incorrect form "*continuó a leer" (*continued read) into the correct one "continuó leyendo" (continued reading) by making use of metalinguistic talk (turn 131) that triggers her correction in turn 134. Importantly, in turn 135, Tim provides reassurance to his peer and repeats the grammatical rule that helped her modify her interlanguage to achieve the task in hand, and hopefully, aiding her second language learning in the long term.

In light of the aforementioned studies from a Sociocultural perspective that have identified specific language beneficial as linguistic tools for co-constructing collaborative and scaffolded activity and/or gaining control over tasks, the following issues will also be explored. The transcribed data will be analysed in order to trace instances of mnemonic use of language and use of affective markers (De Guerrero, 1994; Donato, 1994; and Schiffrin, 1987); and features of private speech, such as repetition of words as a tool to aid problem-solving (Frawley, 1992; McCafferty, 1994; and Roebuck, 2000). These kinds of linguistic data can be identified, counted and systematically analysed both quantitatively and qualitatively. For example, are there any instances of use of such linguistic tools that precede or support the co-construction of a collaborative episode?

Finally, in examining the last research focus pertaining to the specificity of the computer as a mediational tool in the processes of collaborative activity, the comparisons between computer-based and paper-based tasks carried out for the previous two research foci, can be re-examined to study patterns and issues that provide specific information as to the role of the computer; higher indexes of LREs, CEs, and MGEs of one task over another and one operational mode over another will be considered beneficial. In addition, an analysis of differences in quantity and quality of participants' output per pair, per task, and per operational mode should be carried out. Longer turns, excluding turns where participants are reading from the screen or their paper, and/or higher quality interaction e.g. 'knowledge building' interaction will be considered beneficial.

The role of the computer can be indirectly assessed by counting and comparing the

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Table 5. *(a) An extract from a much longer Computer Realted Episode. (b) as a, but translated into English*

63	Lee	o cállate ((she smiles and types?, then they check what they've written, Lee reading what's on the screen)) "esta parte de tu pregunta esta correcta" entonc=
64	Eve	=necesitamos la otra palabra
65	Lee	esta cortado ((referring to the incomplete word on screen))... ten silencio por favor
66	Eve	((laughter)) no se
67	Lee	manten mantener silencio keep trying mantengan silencio mantener es como [keep mantener silencio? man te
68	Eve	[keep es e
69	Lee	es man te n a [n en mantener .. te tenert. [n e
70	Eve	[no] [n e
71	Lee	si
63	Lee	or shut up ((she smiles and types?, then they check what they've written, Lee reading what's on the screen)) "this part of your answer is correct" then=
64	Eve	=we need the other word
65	Lee	it's cut ((referring to the incomplete word on screen))… ten silence please
66	Eve	((laughter)) I don't know
67	Lee	keep ((imperative second person sing. mantener ((infinitive)) silence keep trying keep ((imperative second person plur.)) silence keep is like [keep keep silence? kee
68	Eve	[keep is e
69	Lee	it's man te n a [n en mantener .. te tener t . [n e
70	Eve	[no] [n e
71	Lee	yes

participants' production of the kind of output seen as beneficial in the light of the theoretical framework, but this role should also be analysed in a more holistic and situated way by carefully studying particular episodes that might inform our understanding of the effects of the machine when compared with similar activity without it e.g. what – if any – are the effects and/or limitations of the computer on the nature of interaction. Consider Table 5a and 5b which show extracts from a much longer Computer Related Episode (CRE) (23 turns) which illustrates the value of immediate feedback.

The fact that students are able to receive immediate feedback (turn 63, in Table 5b) presumably encourages them to continue working (see turn 67 [Table 5b] where Lee asks his classmate to "keep trying") and, hopefully, stretching their intelanguage in a way that might be absent, or qualitatively different, without the machine. The main role of quantifiable data in the study then, should be to provide patterns and information of a comparative nature, whereas finely grained qualitative analysis should help us understand the processes of collaborative activity at the computer in a more holistic manner.

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5 Conclusions

This paper has been conceived as an attempt to explore some of the theoretical and methodological issues that need to be considered to carry out a systematic investigation of the processes of collaborative activity in computer-mediated tasks. It is proposed that to further our understanding of these processes we need to pursue an investigation that incorporates two complementary levels of analysis; descriptive, to observe and account for the nature of collaborative activity, and analytical, to discuss the quality of collaborative activity.

Collaboration that takes place as a result of learners working together in problem-solving tasks has been identified as beneficial for the co-construction of linguistic knowledge (Donato, 1994; Swain & Lapkin, 2001; Ohta, 2000). However, the study of collaborative activity in CALL tasks and the specificity of the computer in relation to these processes is still in its infancy.

This paper has attempted to outline a research path for the development and empirical investigation of CALL tasks that might promote collaborative activity in the foreign language classroom. Methodological considerations have been proposed in an effort to contribute to the improvement of CALL evaluation as expressed by Chapelle: "evaluation criteria should incorporate findings and theory-based speculation about ideal conditions for SLA...criteria should be accompanied by guidance as to how they should be used... (and) criteria and theory need to apply not only to software, but also to the task that the teacher plans and that the learner carries out" (2001: 52). Presentation and discussion of the results will follow in later publications (see Gánem-Gutiérrez in preparation).

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