
Communicating and Interacting: An Exploration of the Changing Roles of Media in CALL/CMC

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ABSTRACT

The sites of learning and teaching using CALL are shifting from CD-based, LAN-based, or stand-alone programs to the Internet. As this change occurs, pedagogical approaches to using CALL are also shifting to forms which better exploit the communication, collaboration, and negotiation aspects of the Internet. Numerous teachers and designers have created multimedia applications to help learners understand and make meaning from not just the aural and written language of the target culture, but also some of the visual, social, and cultural nuances. Previous studies of the use of visual and multimedia in language learning have shown promising results. However with a major shift to the Internet as the site for learning, we need to re-evaluate what constitutes communication and interactivity in this new context, particularly with the introduction of newer technologies such as webcams as well as more 'traditional' media such as video, audio, and still images. This paper discusses the characteristics common to CALL and CMC implementations, some of the distinguishing features of each, and aspects of the teaching and learning contexts in which we find each being used. Conclusions are drawn that in order to make the most from the use of these new sites of media interaction in language learning, we need to develop flexible and adaptive learning environments which can incorporate more traditional forms of instructional CALL as well as the newer communication, collaboration and exploration forms.

KEYWORDS

Multimedia, CMC, Learning Environments, Collaborative Learning, Exploratory Learning

INTRODUCTION

As the media we use to communicate in and teach languages with matures, it is time we in the profession took stock of what the current research literature is telling us. What are we doing right and which areas do we still need to address and refine? While multimedia development was predominantly CD or local area

network (LAN) based, the technology had stabilized enough for us to investigate various aspects of the effectiveness and usefulness to students of these media in language learning. However, since we have been moving into web-based language learning incorporating multimedia as and when it is possible or appropriate to do so, the contexts have changed. We can now, for example, add other channels such as audio and video to computer-mediated communication (CMC) for language learning which had previously been restricted to the use of text only. In many cases, the technology we use in these new contexts has not yet sufficiently stabilized for us to design sufficiently well structured investigations of what effects the technology has on language learning. Communication technologies have multiple applications in both our daily lives and teaching. Research into the nexus between multimedia and language learning with CMC at the moment, therefore, seems in many cases to be more driven by the technology, the environment in which it is used and the associated constraints, than on pedagogical and learning factors.

In this paper, I argue that the shape of multimedia applications was previously focused in three major directions, but that with multimodal CMC for language learning, these have changed or been replaced. By multimedia I am referring generally to any combination of video, text, and sound delivered by or through the use of technology, though this will be refined later. Multimodal CMC includes the media employed to communicate and the channels learners use to interact with and within the media. Until the emergence of multimodal CMC, the following three areas represented the major focus of the use of multimedia for language learning:

1. the media available or used (what could be done with it and activities based around it),
2. skill development (listening and viewing comprehension and the related subskills), and
3. media as illustration or enrichment—bringing authentic aspects of the real world into the classroom to promote target cultural and language awareness.

However, with the shift in mode of delivery and access to the Internet, this earlier focus has changed. The very distributed nature of the Internet, the uses to which we put it, and the purposes for which we use it in noneducational settings have strongly influenced how we view the capacities of the Internet and the teaching and learning opportunities it can make available. Point 3 above, media as illustration or enrichment, has become the major focus of our use of multimedia on the Internet in language teaching and learning. This shift in focus has, in turn, affected the educational approaches to language teaching and learning that we employ using this medium. Thus, we now have greater emphasis on and use of the media for

4. exploratory learning such as web quests, virtual tours, and task- or project-based approaches;
5. learning through communication involving negotiation of meaning as exemplified in eTandem projects and various keypal endeavors, discussion

- lists, forums, and chat groups around the world in various languages and making use of a variety of text, audio, and video media combinations;
6. collaborative and negotiative learning, often problem based, such as CMCL (computer-mediated collaborative learning) or WSCL (web-supported collaborative learning) projects which bridge geographic locations and time differences; and
 7. composite forms which are derived from or built on instructionally oriented CALL, but which now employ features of these three newer approaches (points 4-6).

While points 1 and 2 above are still, for the most part, actively used, they have now been conflated into one, which I will call here 'instructed CALL' (one form of Skehan's (2003, p. 408) 'support software'), whether this be CD, LAN, or web based. In Skehan's terms, such support software is used in conjunction with exploratory, communicative, and collaborative learning tasks to supplement areas identified (or noticed) by teachers or learners themselves as gaps in learning. Ideally this type of instructed CALL is used posttask and fulfils the dual purpose of providing effective pedagogic materials to support previous learning and helps learners keep a record of their progress in interlanguage development.

BACKGROUND TO THE NEWER APPROACHES

With the change in focus mentioned above, it is timely to refresh our understanding of the findings of earlier research studies done on the uses and pitfalls of multimedia in language teaching. These lessons learned can then be incorporated into our planning, teaching, and curriculum and instructional design decisions. Through this process, it is hoped that we can make the best possible decisions about what technologies to employ with which student populations. It is, therefore, necessary for us to have, at the same time, a very clear understanding of the possibilities and constraints of the media in relation to pedagogy and learner needs and to remain flexible and creative in our view of what can and could be done. Teachers have, after all, shown themselves to be perennially adaptive!

As Jonassen (1992) has commented,

Technologies do not directly mediate learning. That is, people do not learn from computers, books, videos, or the other devices that were developed to transmit information. Rather, learning is mediated by thinking (mental processes). Thinking is activated by learning activities, and learning activities are mediated by instructional interventions, including technologies. Learning requires thinking by the learner. In order to more directly affect the process, therefore, we should concern ourselves less with the design of technologies of transmission and more with how learners are required to think in completing different tasks. (p. 2)

So whether students like it or no—and sometimes they do not—teachers should and do require them to think, even when using technology as the medium of learn-

ing, including such personal communication technologies as email and video/voice-enhanced chat.

The nature of our use of technology changed with the adoption of Internet tools in our daily lives. Now, with the addition of multimodal capacities and the change in emphasis to the use of technology to mediate communication in second language learning, the roles of teachers and learners are also changing. Felix (2002), for example, makes the following observations in relation to Internet use for language learning and teaching:

One thing that it is essential to realise is that the most interesting part of what is happening on the Web is not visible to the observer. What really matters is what is taking place in the communication between users of the Web ... the critical difference ... between content and connectivity. ... A realistic assessment of Web-based teaching is that it is not a time-saving approach, but rather a time-shifting one. Teachers will save on the time they would otherwise spend preparing elaborate materials, but they will also have to invest time in assisting in the organization of tasks and projects, moderating communication, and creating sound assessment strategies. (p. 12)

As we increase our reliance on electronic communication technologies in both the personal and professional or educational spheres of our lives, we can therefore expect changes to continue to unfold in the nature of the work we do as teachers, the materials that constitute pedagogic tasks, and the roles teachers and learners have in these new educational environments. In subsequent sections, this paper will explore how our learners process and use the information that they acquire and convey while using the newer technologies for language learning and what this tells us about the range of pedagogical approaches we can employ to achieve different goals. As mentioned earlier, this entails a shift also in the range of pedagogical approaches we choose—a shift in the very exciting direction of intentional, flexible, active, experiential, learner-shaped pedagogy.

THE INFORMATION/KNOWLEDGE SOCIETY

In examining the concomitant changes in our daily lives and work that communication technologies have brought, I approach the role of changing pedagogy from the concern of previous authors in the area of the role of information, knowledge, and educational change. In his discussion of the interaction between knowledge, education, and technology, in the context of the 'Information Society' or the 'Knowledge Society,' Chen (1992, pp. 161-2) claimed that "the impact of information technologies on the social institutions responsible for knowledge production and distribution such as universities and schools is far less significant" than in other social arenas such as industry, business, or international relationships. From his examination of the historic time frames and characteristics involved in the gradual ontogenetic and exogenetic evolution of knowledge, Chen concluded that "information technology is mainly involved in the social fabric concerned with the creation, accumulation, preservation, and distribution of Exogenic (pub-

lic) knowledge ...” (p. 166). That is, exogenetic knowledge refers to “all public knowledge accumulated by mankind since the beginning of civilization by complex social processes.” On the other hand, for Chen, ontogenetic knowledge is “the knowledge that grows in the individual” consisting of both innate and learned knowledge.

In fact, it was not until individual or ontogenetic technologies such as the Internet, email, and chat (see also Murray, 2000) became ubiquitous in our daily lives—and that of our children, parents and even grandparents—that technology became an acceptable and accepted partner in learning. The advent of uses of technology for human-human communication and ontogenetic knowledge acquisition, therefore, marks the watershed for the change from the previous exogenetic manifestations of information technology, as defined above, to the current personal and individual applications, including language-learning applications. By this stage, of course, it was the Internet and CMC incarnations of CALL that had become the norm.

MEDIA AND MULTIMEDIA LITERATURE

A survey of the literature relating to media and multimedia reveals discussions of the past and present uses of media, attempts to define terms and elucidate characteristics, studies of effectiveness, explorations of the concept of interactivity, as well as specific studies of features found only in CMC environments. An analysis of publications relating to CALL in such major journals as *CALICO*, *System*, *CALL*, *Language Learning & Technology*, and *ReCALL* over the last 5 years, reveals a trend away from the uses and roles of multimedia in the facilitation of second-language learning and towards the communicative and interactive elements of CALL, commonly known as CMC. Since the major issue under discussion in this paper is the nature of changes in media use for language learning being brought about through technological advances, the argument as to whether or not CMC actually should be incorporated into the field known as CALL will be put aside for another time. However, there remains the question of whether multimedia is still important in CALL or, indeed, in language learning in general. An essential adjunct to the discussion of multimodal CMC and multimedia CALL is the concept of interactivity. CALL programs have always been described as ‘interactive.’ In the context of communicative pedagogy, why otherwise would we want to use them? However, no clear explanatory definition of this term has been forthcoming in recent years. In the absence of a clear definition, it is difficult to make comparisons among different CALL applications or uses of CMC or, indeed, between different methods of language teaching and learning using technology. The concept of interactivity in the CALL/CMC context is therefore also explored below.

PAST AND PRESENT MULTIMEDIA APPLICATIONS

Multimedia seems to have had its heyday in the 15 years between 1985-2000. However, towards the end of this period, our fascination with ‘real’ person-to-per-

son communication seems to have overtaken our research, reflection, and practice with the use of multimedia to enhance our learners' learning of language. At the same time, as has happened frequently in the past, the technology has not yet reached the level of sophistication and transparency that would make it easy and convenient for our learners to make use of the (still embryonic) multimedia capacities of CMC. Very few examples are yet available of Internet-based multimedia language-learning or teaching resources, and the resources or language programs that are being studied are either LAN-based programs that have been converted and modified for web-based access (Hoven, 2003), hybrid models involving sometimes quite radical changes to our earlier approaches to language teaching and learning, (Kötter, Shield, & Stevens, 1999; Hogan-Brun & Laux, 2001; Liontas, 2002; Khine & Lourdasamy, 2003; Parks, Huot, Hamers, & Lemonnier, 2003), or purposefully built web-based language learning materials (Shawback & Terhune, 2002; Weinberg, 2002).

In order to find specific academic discussion of the changes in forms, roles, and applications of multimedia and language these days, we need to examine literature in the fields of instructional design, new media, and communication studies. The focus of studies involving multimedia applications has changed from whether and to what extent multimedia enhances learning (Brett, 1995) to techniques and approaches for maximizing learning (Hoven, 1997, 2003; Gibson, 2002; Love, 2002; Kabata & Yang, 2002) and the perennial dilemma of how to find common ground for making meaning between the technical or instructional design experts and the teachers of a subject or content area (Keppell, 2001; Sinclair, Aldred & Smith, 2002). This last question remains a problem as teachers work towards creating the more flexible environments their learners expect, often requiring the provision of CD- or DVD-based multimedia learning materials that are quite technically challenging to create. The redirected focus on pedagogy has also meant a move away from the language interactionist approaches to instructed CALL research originating in the second language acquisition research area of Chapelle (1998) among others.

DEFINITION OF MULTIMEDIA AND ITS CHARACTERISTICS

Hartman, Diem and Quagliana (1992, p. 176) defined interactive multimedia as a "synthesis of computers, video, text, and sound" combining "the best parts of *multimedia*—the integration of various forms of information—and *hypermedia*—the non-linear linking of information to create applications that both stimulate and respond to the individual." Others, such as Ashworth (1996), have preferred to separate multimedia from hypermedia by defining hypermedia as multimedia with links. However, for the sake of simplicity, the term multimedia will be used here in the form its use takes on the Internet, that is, including linked hypermedia (see also Hoven, 1997). Obviously, when we begin to look at the range of media that are found within multimedia and hypermedia, some discussion is then necessary of how learners use media: which learning styles are more compatible with which media and what are the features of different media currently available under the rubric 'multimedia'? When media are employed for language learning,

the features of each one need to be taken into consideration, as well as the effects each might have on learners with different learning style preferences. In addition, teachers also need to be aware of their own preferred teaching and learning styles in order to be able to select learning resources and communication technologies for learners that cover a range of styles, not necessarily just looking for the best fit between the technology and preferred styles (Hoven, 1997). As Summerville (1999), for example, found in her study of cognitive style and hypermedia, support does not always correlate with structure and, regardless of cognitive style, learners want or prefer to interact with an instructor. Her study also showed that, regardless of cognitive style, learners achieved better when more resources (channels and suggestions for instructional paths) were provided. As Bickerton (1999) has commented,

The multi-modal aspects of cognition have long been documented in cognitive science and there is good experimental evidence for considering that learning processes vary with the mode of communication (visual graphics, visual reading, sound). The specificity of multi-modality in language learning is less well researched, in particular the degree to which links between the modes must be planned and executed in order to maximise pedagogical benefit. (p. 75)

In the next section, therefore, we review the literature on the relationship between the presentation and exploration of learning material in different modalities as employed in CALL and online and the strategies learners and teachers use to structure and make meaning of such material. This review aims to summarize what we have found over the last several years about the interaction of learners with multimedia materials, to shed light on what features to highlight in our development of such materials, and to discover which cognitive and learning strategies are useful in helping learners take best advantage of these materials. This information will then inform our discussion of the shape and characteristics of the learning environments which can enhance second-language learning using multimedia.

EFFECTS OF MULTIMEDIA OR HYPERMEDIA ON LANGUAGE LEARNING

A recurring theme running through the studies undertaken in the area of CALL and multimedia is the various effects of including media of different kinds in language learning materials in the development of skills such as reading. Plass, Chun, Mayer, and Leutner (1998), for example, examined the effects of individual differences on the ability of learners to integrate verbal and visual learning using specific characteristics of multimedia. They found that students remembered individual word translations better when they had selected both visual and verbal annotations during the learning phase. Similarly, Baltova (1994) and Raphan, (1996) found that learners who were highly visual in preferred sensory mode of perception seem to comprehend a reading passage more readily if video or multimedia were used to set the scene. However, when Plass, Chun, Mayer, and Leutner (2003)

went on to investigate the relationship between specific learning preferences and word recall, they found that the visual annotations were the least effective for all learners and that the visual annotations also disadvantaged low-verbal- and low-spatial-ability learners. In his study based on Slatin's user-browser distinction, Ganderton (1999) noted the strong influence of learning styles and the use of online reading strategies, including information classification and activation of background knowledge for inferencing. He also observed, however, that learners often focused on finding and following hyperlinks before, or indeed rather than, engaging in paragraphs or longer passages of text when reading online. These findings, together with student comments about focus on subordinate features of a topic without the superordinate big picture also indicate that online reading of hypermedia may actually disadvantage holistic, top-down learners.

Also in the area of learners' actions using hypertext, Son (2003) studied the attitudes and perceptions of a group of students learning Korean as a foreign language who worked on three different text formats: paper based (PF), computer-based nonhypertext (NHF), and computer-based hypertext (HF). Overall, learners found the HF and NHF modes to be the most and least helpful respectively, while the technical clumsiness of having to move between screens in the NHF mode seemed to have a negative effect on their responses on all measures. Their reactions to PF, on the other hand, were more positive in many cases because of their stated familiarity with that format. This effect may, of course, change in a few years as the computer screen is increasingly used as the site to find and read information. Son also noted that individual learning preferences influenced some learners' attitudes towards the usefulness of the audio and visual modes, with some in fact deciding not to use the alternative modes at all. In his conclusions, Son pointed out the importance of training learners to take full advantage of the additional features offered by hypertext environments (see also Hoven, 2003) and that the ability to search for information in hypertext multimedia environments and structure it effectively for learning will soon become essential skills.

Working memory, cognitive load, and familiarity with the field also play critical roles in determining the usefulness of information presented in different modes. As Kalyuga (2000, p. 170) found, "concurrent duplication of the same information using different modes of presentation increases the risk of overloading working memory capacity and might have a negative effect on learning." In conclusion, Kalyuga offered three suggestions for improving the efficiency of the use of multi-modal materials: (a) presenting explanations aurally rather than in writing, (b) delaying written explanations until after the aural explanation is complete, and (c) providing more experienced learners with the facility to turn off or skip textual explanations when auditory or visual material is already available.

As Oliver and Herrington (1995) described it, the effectiveness of hypermedia learning materials depends on the nature of the material (focus on higher order skills or knowledge acquisition), content presentation, and learner characteristics (Hoven, 1997). As several researchers have found, learner perceptions of the value of their learning experience using technology and multimedia also depend on the transparency and robustness of the technology (see also Downes, 2000).

In other words, if the technology frequently breaks down, takes too long to load or change between programs, or the programs crash, learners will become dissatisfied and lose the interest and motivation necessary to continue learning using these media (Herrington & Oliver, 1997; Felix, 2003; Hoven, 2003).

In addition, the research literature on learner interactions with hypermedia, on-line texts employing a range of media, and the use of the web for language learning in general, points to the changes in literacy needs and the sites of literacy that occur with the broadening possibilities which increasingly fast and sophisticated technology offers us (Constanzo, 1992; Selfe & Hilligoss, 1994; Tuman, 1996; Murphy-Judy, 1997; Murray, 2000). One of the critical aspects of literacy in these contexts is the more active role that learners play in interpreting what they read, see, and hear. Essential to an understanding of the mediating role that technology plays between learners and language is the concept of interactivity that is commonly cited as an intrinsic feature of CMC and contemporary multimedia CALL. In the next section, we will examine this construct of interactivity.

INTERACTIVITY AND CALL

As mentioned earlier, interactivity is a critical feature of the use of CALL in general and multimedia in particular. Numerous software and web-based applications cite interactivity as one of the important features of those applications, but very little investigation has been undertaken to determine what exactly the term 'interactive' refers to in the context of technology-mediated language learning, including the use of multimedia. Some explication of the term therefore seems necessary. In addition, as several researchers in new media in information technology (Kiousis, 2002), instructional design (Sims, 2000), and general applications of information communication technology (ICT) in education (Rose, 1999) have recognized, in order to be able to evaluate the effectiveness of the use of interaction in software applications, it is necessary to have some way of operationalizing the terms 'interactive' and 'interactivity' such that they can be investigated. That is, for informed academic discussion and investigation of a feature or group of features to take place, researchers need to know that they are using common terms of reference. On this topic, Sims (2000) posed the question of whether computer-based applications can (or should) attempt to replicate the level of communication equivalent to real life learner-to-learner or teacher-to-learner communication. Clearly, this question is much less an issue with uses of CMC, particularly audio- and video-enhanced CMC, but what of other multimedia applications? Sims (2000, p. 47) identified the following dimensions as characteristic of interactivity in learning theory:

1. learners—the *who* of the learning process,
2. content—the *what* of the learning process,
3. pedagogy—the *how* of the learning process, and
4. context—the *when* and *where* of the learning process.

While concluding that "computer based interactivity is not a promise unfulfilled, but rather a promise not yet realised," Sims seems to imply that interactivity

is a construct deriving more from our pedagogical viewpoints and interpretations of learning theory than any constructs made manifest by or through the technology we use. Certainly, if we review his four dimensions of interactivity in light of the work of Jonassen (1992), Hartman et al. (1992), and Felix (2002), uses of technology would seem to fit best in both pedagogy and context, though feasibly also playing a role in content. We can assume, therefore, that in the field of CALL, the extent to which the term ‘interactivity’ can be applied to a computer-mediated activity depends at least on pedagogical approach, content, context, as well as learners, with various slippages and exchanges occurring within these dimensions. We could imagine, for example, a traditional discrete-point grammar activity on the web (not particularly interactive) designed by a teacher to fit into a series of activities involving pretask individual inductive work (either face to face or computer mediated) and posttask discussion of correct and incorrect answers in which learners articulate their conclusions about how the rules for that point actually work in their experience of working their way through the pretask and posttask activities. As Hoven (1997, p. 11) has defined it, interactivity “can also be taken to mean the capacity the package [CALL/CMC] provides for the learner to *interact with, interpret, negotiate, and make meaning* from the texts available, whether these are orthographic, audio, audiovisual, or visual texts.”

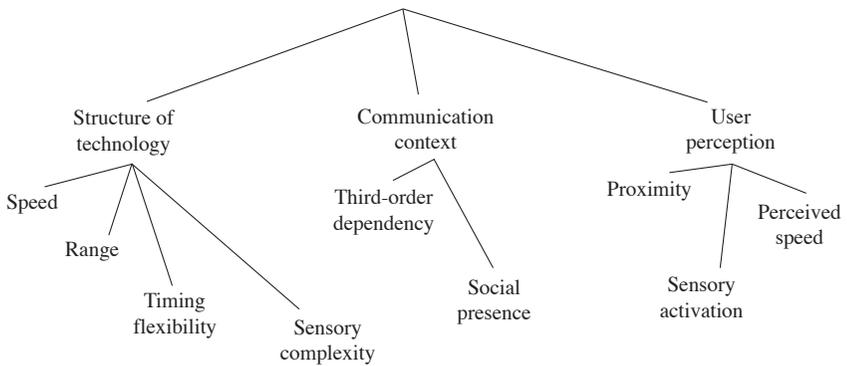
Kiousis (2002) took the explication of interactivity further in the direction of learner or user perceptions in his definition of interactivity in CMC contexts.

[Interactivity] ... can be defined as the degree to which a communication technology can create a mediated environment in which participants can communicate (one-to-one, one-to-many, and many-to-many) both synchronously and asynchronously and participate in reciprocal message exchanges With regard to human users, it additionally refers to the ability of users to *perceive* the experience to be a simulation of interpersonal communication and increase their awareness of telepresence. (p. 379, italics in original)

Kiousis diagrammatically represented the relationships among the various aspects of the components of interactivity in communication mediated by technology in terms of structure of technology, communication context, and user perception (see Figure 1).

While some research work in CALL has included investigation of aspects of the structure of technology, most studies have focused principally on the areas of communication context and user perception. With increasing moves in CALL towards Internet-based siting of language learning and the further shift towards exploratory and communicative uses of the Internet, we are moving away from instructed CALL. We now seem to be at a point in the evolution of CALL, and CMC implementations of CALL, to posit the claim that, depending on the pedagogy employed, the term interaction is more appropriate to these communicative uses of CMC than the term interactivity. Since interaction occurs in human-to-human communication via the mediation of technology, we, therefore, no longer require the term interactivity to apply to CMC in language learning.

Figure 1
Interactivity (Kiousis, 2002, p. 378)



In light of this discussion, it is important now to look at the interdependencies between interactivity and the environment from which it derives, including elicitation of learner perceptions and investigation of the pedagogy creating or surrounding it. An emerging approach to this kind of investigation into dynamic interdependencies is found in the ecological paradigms advocated by researchers such as Freeman (1998), van Lier (2000), and Tudor (2003). Such qualitative paradigms may be the most appropriate approaches currently available to us for investigating the learning environment as a whole. When numerous studies have been completed in different environments, it should then be possible to identify those aspects of the communicative context (among learners, among learners and teachers, and among learners, teachers, and the mediating technology) and learner perceptions that represent the essential or desirable features of effective technology-mediated learning environments.

As discussed above, CALL-inclined language teachers are increasing their use of communication technologies in the teaching and learning of language, whether these technologies be synchronous, 'delayed synchronous,' or asynchronous. We now turn, therefore, to an examination of how learners use these technologies to communicate in their second language and what differences emerge among these different modes of human-to-human and human-to-computer interaction. The following sections also aim to further our understanding of the changing areas to be investigated in learning environments incorporating the use of CMC.

CMC MODES, MEANS, AND MANIFESTATIONS

For the sake of simplicity, descriptions of these electronic means of communication are generally divided into 'synchronous' ('real time') such as chat, MOOs and some virtual reality environments and 'asynchronous' (subject to a time delay while the sender waits for the receiver to access the message, or while some other mediation or moderation of the message takes place) such as in forums, bulletin boards and email. However, in spite of the term synchronous, a delay is still experienced by users since the message must first be typed in and then sent using the

enter key on the keyboard. In addition, now that many students and classes, in industrialized countries at least, have access to broadband connections, more direct communication involving more media is possible. Because of the rapid advances in technology coinciding with the wider availability of broadband telecommunications producing some of the newer incarnations of CMC now in active use, I suggest that the term 'synchronous' should now be restricted to communication through these newer forms, while keyboard-based communication delayed by the enter key be termed 'delayed synchronous.' The term 'asynchronous' can still be maintained as a classifier for those forms of electronic communication such as email which are constrained by time delays due to moderation, response times, or time-zone differences.

SYNCHRONOUS CMC USING MULTIMEDIA

As mentioned above, the use of communication media is still an emerging technology. Examples of this media include one-to-one, one-to-many, or many-to-many communication using webcams, headphones, and microphones, as well as text and images through keyboards and computer monitors, as found in environments such as Webheads, or TappedIn. In the Webheads environment, for example, participants can choose to use an audio-supported webcam (which would fall into the synchronous category) or limit their participation to keyboard-only input, audio-only input, or combinations of any two or three of these media. While the keyboard input is still dependent on hitting the Enter key for transmission, the audio and video channels, once activated, are not. Participants login to a prepublicized session at a particular time and can exchange ideas, information (and of course jokes) with other participants in real time, with audio and video (see also Stevens, 2002, 2004). The teacher perspectives or technology-oriented reflective testimonials associated with TappedIn are very informative with regard to the view that seems to prevail among these (now converted) technology-using teachers. Most prominent among these views, which reinforce our own experiences and intuitions, is the principle that the technology is a resource or a tool to be used and that the pedagogy remains paramount.

An early model of audio-only 'hybrid multimedia CMC' is also described by Kötter et al. (1999) in which a combination of audio and email in a distance learning program was used for French and German languages. In this study, learners' initial approaches to use of the technology were slow, particularly in determining turns and taking risks. However, after some familiarity and practice in the environment, written electronic communication, and task activity in email, learners appreciated the opportunity to discuss some of the issues arising from the email communications and tasks in real time by means of an audio channel.

DELAYED SYNCHRONOUS AND ASYNCHRONOUS FORMS OF CMC

Numerous language teachers and projects around the world have been using email as a means for intercultural communication and second language learning for many years. The fact that such organizations as the eTandem project (<http://www.slf.ruhr-uni-bochum.de>) exist is evidence of the usefulness and popularity of this

use of CMC technology. Through such partnering arrangements, teachers are able not just to provide target language speakers with whom their learners can interact, but also to enrich the language learning environment by providing the opportunity to participate in the formation and maintenance of learning communities.

Another form of predominantly text-based CMC that has become popular with language learners and teachers for its immediacy, fostering of a sense of community, and possible level of interaction and creativity, is the MOO application, derived from Multi-user domain (MUD) Object Oriented. Over several years, many different manifestations of this application have been created for the purposes of learning and practicing language in real time, as well as practicing creative thinking and writing. The MOO was one of the first collaboratively constructed environments for this purpose, and one of the longest running MOO is for ESL/EFL called SchMOOzeU.

At the site of SchMOOzeU itself, apart from information on the history of MOOs and how to use them, there are several links to useful 'classroom' activities—whether the classroom is real or virtual. From the *LinguaMOO* site, through the *EnCore* MOOs portfolio, is a range of MOOs around the world in different fields that are operating at the moment. For an excellent discussion of the uses of text-only MOOs, including some of the drawbacks, see Backer (2001). Research into the uses and efficacy of MOOs for language teaching and learning seem to indicate that learners must be involved in the design of learning environments and that they need to be made aware of and trained in the use of learning strategies appropriate to a self-directed or autonomous learning environment, particularly the metacognitive strategies of planning, monitoring, and reflection (Schwienhorst, 2003). In addition to these, Shield, Davies, and Weininger (2000) emphasize the capacity for MOOs to break down barriers among learners and between learners and teachers, thereby promoting more collaborative problem solving. Further, findings related to discourse show that, while there are medium-specific features of MOO discourse in both L1 and L2 exchanges (augmentation of written medium by various means), participation in MOO interactions can promote L2 oral production, in spite of the written/oral production differences (Weininger & Shield, 2003). This finding has also been supported in a larger scale study of L2 oral development through participation in electronic chatroom discussions (Payne & Whitney, 2002). Both of these latter studies have also shown the advantage that CMC offers learners over face-to-face (F2F) communication for reflection time during interaction, which improves the quality of their language output.

In their recent study of the extent to which the quality of communicative exchange is affected by the use of CMC rather than F2F negotiation in collaborative decision-making tasks, Cornelius and Boos (2003) found that only with specific training could users approximate their performance in F2F conditions. This training has to aim to raise users' competencies to high levels in both the communication and media areas. Specifically, this training needs to include

1. explicit references to topics of other group members (directly addressing key words: coherence),

2. establishing communication sequences by asking and answering questions,
3. direct use of partners' names, and
4. grounding processes established through the preceding training.

However, while cautioning us on the preliminary nature of this untangling of the threads of conversational coherence, mutual understanding, and convergence in this study, Cornelius and Boos also mention that "mutual understanding based on conversational coherence does not foster the frequency of consensus" but that "coherence can readily be substituted by interpersonal attraction" (p. 173). In other words, when participants like each other, they can overcome the lack of coherence of the computer-mediated conversation to reach consensus. Clearly, interpersonal factors other than those examined in the study are at play here. These findings of 'rogue factors' are also supported by tandem email studies showing the importance of first establishing personal relationships between tandem partners before pedagogic tasks can be successfully undertaken (Appel & Gilabert, 2002). Haythornthwaite (1999) and Söntgens (1999) have both found that personal relationships and the more private one-to-one communication media (telephone and email) facilitate information sharing and are more frequently preferred by more successful learners. As discussed earlier, some explanatory power could also be derived from the personal nature of the original uses of these media.

In her 2001 study of the range of social roles learners adopt in synchronous CMC compared to pencil-and-paper group journal writing, Abrams found that learners not only adopted "a larger variety of participant roles during CMC than in group journals" but that "these roles were also more interactively negotiated in the CMC environment" (p. 489). This evidence forms a compelling argument for further studies of the social aspects of language learners using CMC. However, in order for a fuller picture of the opportunities and constraints of learning environments incorporating or relying on CMC to emerge, much more work needs to be done in the area of the strategies that effective learners use in different CMC contexts, whether these strategies are linguistic, paralinguistic, social, or some other kind. It would also be informative to improve our understandings of the ways in which learners help each other in these contexts (e.g., negotiation of meaning and scaffolding) and the roles of teachers in the interactions, including the effects of these roles on language learning.

LEARNERS AND TEACHERS AS SOCIAL BEINGS: SOME CAUTIONS

A theme that seems to be emerging from many of these studies is the importance of social dimensions. However, with this social dimension of CMC also come the complications (for language teachers) or opportunities of other aspects of our lives as social beings, mostly prominently the political. These can range from the disruptions in online class communities produced by flame wars among online learners, to the destruction of the careers of unwary online teachers (Hailey, Grant-Davie, & Hult, 2001). As can be seen from the proliferation of listservs and

newsgroups in developing countries, a history already exists of people using the Internet and CMC to voice their opinions and concerns, to find others with similar concerns, and to form themselves into politically motivated groups, thereby raising solidarity. More recently, Rheingold (2003) predicted more pervasive political waves to emanate from the uses of these technologies—waves affecting our societies as a whole. He made the assertion, for example, that

[o]nline social networks are human activities that ride on technical communications infrastructures of wires and chips. When social communication via the Internet became widespread, people formed support groups and political coalitions online. The new social forms of the last decade of the twentieth century grew from the Internet's capability for many-to-many social communication. The new social forms of the early twenty-first century will greatly enhance the power of social networks. ... citizens will discover new ways to band together to resist powerful institutions. A new kind of digital divide ten years from now will separate those who know how to use new media to band together from those who don't. (pp. xviii-xix)

From a rather different perspective, Reeves and Nass (1996) have produced quite persuasive evidence from a range of studies to show the extent to which we now treat computers and new media like real people and places. They set out to apply the same research methods used in human-human and human-environment studies in the social sciences to studies of human-computer and human-media interactions. Instead of using all human subjects, their groups of subjects were studied with computer partners or using different features of media delivered by means of computers. On a range of social reaction measures from politeness to interpersonal distance, flattery, praise, and criticism and from personality judgements and simulations to emotions, social roles, gender, and voice, they found that "people's responses to media are fundamentally social and natural" (p. 251).

In the educational context, Davies, Shield, and Weininger (1998) have pointed out that "[t]eachers must be concerned with what the students are doing with themselves rather than with the language, which is the students' concern." One role of teachers using CMC for language learning then becomes to help learners navigate between their social and educational goals in such a way that their learning aims are achieved while not compromising their personal or social selves. Finding the appropriate path is often a balancing act between discovering and allowing for different personalities, learning styles and preferences, and accommodating strategies for interacting and dealing with negative encounters that inevitably occur. And all of this must occur through the medium of technology which will often be unfamiliar to many learners. As discussed earlier, much of the CMC interaction to date has been through the medium of text, with audio and visual modes only recently becoming available. For some years, however, there have been some forums where graphical user interfaces (GUIs) and have been implemented. These developments will be outlined in the section below.

GRAPHICAL AND VISUAL MANIFESTATIONS OF CMC

Originally created by science fiction writers and computer engineers to create personalities or characters to interact in virtual worlds and electronic role-play games, avatars can be described as the wrapping of a form of human personality around an electronic presence. Avatars have been adopted enthusiastically by certain language learners, typically those whose learning style is predominantly visual and those for whom having a different persona behind which to operate gives them the necessary confidence and impetus to express their ideas and opinions. In this respect, the use of avatars and electronic communicative or social role-play interactions provide shyer, less-vocal learners with an opportunity to participate at a level of (inter)activity which they would otherwise find difficult to envisage. Users of avatars in such spaces as Avatar Palace, for example, can create their own avatars, if they have the technical skills, buy, trade, or clone avatars created by others, with their permission, and then modify them (<http://www.thepalace.com/palace/avatars>).

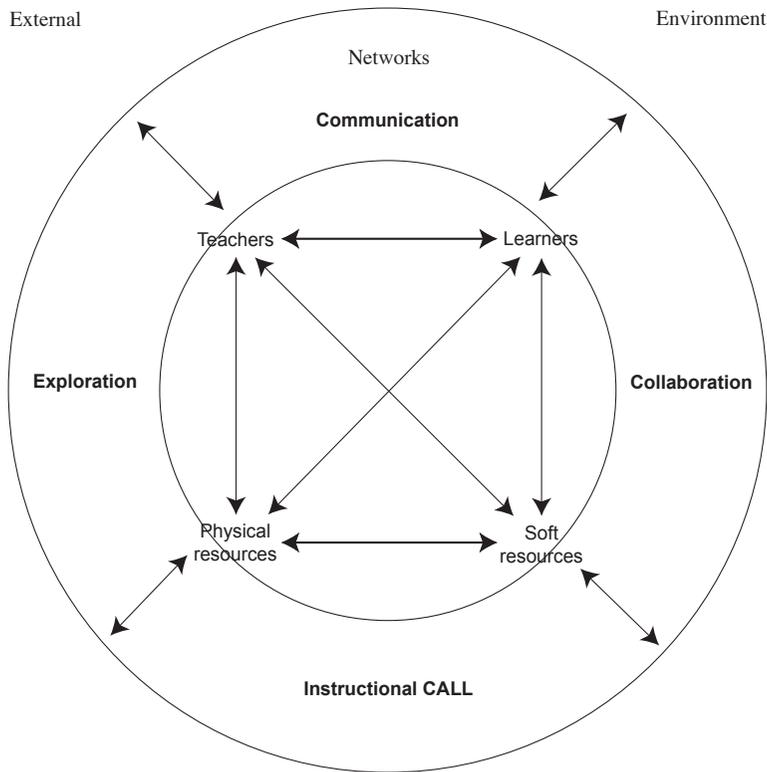
In terms of multimedia and learning styles, these graphical characters provide more visual learners with the necessary stimulus to make the otherwise very text-based medium more user friendly. However, unless teachers or learners create their own ‘palace’ or chat space, these graphical chatrooms can be a little overwhelming for L2 learners. Some creative and hard-working language teachers have created graphical simulations to provide a supportive and appropriate environment for language learners, particularly those whose learning styles are more visually oriented to participate in realistic interactions (Coleman & Kessler, 2004). However, since this sort of development requires considerable programming and design skills, such projects are very rare, slow to develop, and often language- or culture-specific.

MULTIMEDIA, MULTIMODAL LEARNING ENVIRONMENTS

Having examined the various aspects of contemporary uses of media in CALL and CMC, it is time to return to the pedagogic shifts outlined at the beginning of this paper to see if a clearer picture now emerges of the current roles of media in language learning mediated through the use of technology. Specifically, we now look at some of the features of language-learning environments that foster learning through exploration, communication and collaboration presented in points 4-7 in the introduction to this paper.

A learning environment comprises not just a physical space in which the human resources such as teachers, learners, and other resources—including technology—come together. However, while these are essential features, a learning environment is also much more than this. It is rather the essentially intangible conflux of teachers—their pedagogy, beliefs, roles, prepared materials, and resource lists; of learners—with their needs-driven goals, competencies, learning styles, and strategies; of physical resources—technology, libraries, virtual or ‘soft’ technology represented by software, and Internet facilities and resources; and the networks among all of these in which learning takes place (see Figure 2).

Figure 2
A Learning Environment Model



One example of ‘soft’ technology to supplement a learning environment is found at The Learning Place (<http://education.qld.gov.au/learningplace>) created by Education Queensland. This resource comprises ready-made courses, tools for teachers and learners to create their own materials, online communities, various communication tools, re-useable learning objects, useful links, and online as well as F2F workshop activities. Although this site is not specifically designed for language learning, since it has been created with flexible use in mind, the task of using or repurposing the resources is quite feasible. Another kind of exploratory learning environment is found at On the Line (<http://www.oxfam.org.uk/cool-planet/ontheline/explore/expindex.htm>). This site forms the starting point from which a range of visual resources is provided for teachers to create their own tasks for learners to explore on their own, in groups, or with guidance. This kind of site (of which there are many) represents a resource which can be used to combine exploratory, collaborative, and instructional CALL. Enchanted Learning is a rich resource site for teachers and younger language learners (<http://enchantedlearning.com/Home.html>). Using these resources, learners and teachers can explore individually, work collaboratively as class groups, or work collaboratively with individuals located in other parts of the country or the world.

An excellent example of an online learning environment for a single subject area (Modern Greek) which incorporates exploration, collaboration, and communication as well as instructional CALL is Hellas Alive. Within this environment, learners can access play spaces which include specific language activities (form-focused as well as interactions) and exploratory culture and language-learning activities. The environment also provides some visually rich environments which the designers have named a Virtual Interactive Cityscape and a Virtual Classroom. These spaces also provide the common support features of dictionary facility and chatrooms.

CONCLUSION

As mentioned at the beginning of this paper, it is only when the technology becomes stable that we are able to conduct sufficiently rigorous investigations of the effectiveness, usefulness, and appropriateness of the use of that technology in improving the learning experience of our learners. Therefore, while the technology continues to develop, change, and expand its uses so unpredictably fast, teachers employing technology to mediate teaching and their learners' learning need to work on developing a flexible and adaptive pedagogy that suits their teaching philosophies and fits with the teaching and learning environments within which they work. As part of this flexibility and adaptability, we need to examine and reflect on the new personal and learning strategies that both learners and teachers themselves need to develop.

As we move towards offering an increasing range and variety of online, technology-mediated, and self-access language-learning materials, it is important to remember and consider the needs of learners in actually utilizing these materials. In particular, learners' awareness of their own learning styles and strategies and how appropriately they can apply them are critical to their success in using CALL/CMC materials for language learning. This entails a strong need for informed pedagogy in the design of learning environments incorporating technology (online, LAN based and stand alone) and the importance of developing learners' language learning strategies, particularly on the metalinguistic and metacognitive side, to assist them in maximizing their use of this technology.

From a pedagogical perspective in the field of CALL, we, as teacher-authors, are faced with great heterogeneity among our learners and in the teaching environments in which we will find ourselves at any one point in time and over the course of our careers. Within these contexts of variable platforms, environments, and learners, we are constantly trying to implement the best possible programs, while operating under curriculum, institutional, financial, time, technical, and skill constraints. Teachers using CALL/CMC or planning to use some form of online provision of language learning materials, therefore, need to be able to find, evaluate, and use whatever resources and programs are available. At the same time, however, it is important to heed the findings of previous experience in the area of media, particularly multimedia-related CALL.

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