

THE IMPACT OF COMPUTER-MEDIATED COMMUNICATION ENVIRONMENTS ON FOREIGN LANGUAGE LEARNING: A REVIEW OF THE LITERATURE

by **Hassan Saleh Mahdi**

Najran University,

King Abdulaziz Road, Najran, Saudi Arabia

almatari7 @ gmail.com

Abstract

This article reviews the literature on the implementation of computer-mediated communication (CMC) in language learning, aiming at understanding how CMC environments have been implemented to foster language learning. The paper draws on 40 recent research articles selected from 10 peer-reviewed journals, 2 book chapters and one conference proceeding. It investigates the studies that have dealt with the CMC environments used for language learning, in particular the benefits of CMC in language learning; factors affecting the use of CMC in language learning, and current CMC environments used for language learning (such as emails, wikis, *YouTube*, *Facebook*).

The review discusses the findings of these studies and suggests guidelines for future research studies in this area. It concludes that further studies are necessary to investigate how language teachers can integrate CMC environments and organize suitable tasks. Also, further studies are necessary to determine the principles that are required to implement CMC in language learning.

Keywords: computer-mediated communication (CMC), benefits of CMC, factors affecting CMC, language skills, CMC environments

1. Introduction

Computer-mediated communication (hereafter CMC) is a powerful tool that has changed the ways of people's daily life, work, and learning. It helps to communicate with people all around the world. CMC activities can be asynchronous, i.e. in the form of writing emails, or posting responses to a discussion board online, or can be virtual synchronous conversations held in chat rooms, and so on. The developments of computer technology have created new opportunities for language learning that cannot be found in traditional classrooms. Many environments have been introduced to enhance language learning. One of these is computer-mediated communication

(CMC). CMC can be broadly defined as "human communication via computer" (Higgins, 1991). It involves interaction between humans using computers to connect to one another and generally refers to "any communication pattern mediated through the computer" (Metz, 1994). Many studies and books have been published about the uses of CMC in language learning. They have discussed a wide range of topics such as the benefits of CMC in comparison to traditional classrooms, CMC environments used for language learning and the factors affecting the uses of CMC in language learning. These studies need to be reviewed to help the researchers find out the area that were not explored or fully examined.

Therefore, the present review tries to shed the light on the areas that require more attention. The purpose of this review is to answer the following questions:

1. What are the general factors affecting the implementation of CMC in language learning?
2. What are the uses of CMC in teaching language skills?
3. What are the current CMC environments used for language learning?

2. Reviewing CMC literature reviews

The implementation of CMC in language learning has been examined by many journal articles, conference proceedings, and books. Some attempts were introduced to review these studies. Cole, Beam, Karn & Hoad-Reddick (1992) listed over 400 references regarding CMC, but only about 15% of them were empirical studies. Wallace (2003) reviewed more research articles to examine the interaction among teachers and students in higher education. Romiszowski & Mason (2004) reviewed over 100 research articles published between 1996 and 2003. They focused on the recent growth in research on asynchronous text-based CMC. Luppicini (2007) reviewed 170 research articles selected from 78 journals to examine the recent developments in CMC research for educational environments.

The major limitation of these reviews is that they have examined the uses of CMC in general education, not language learning. On the other hand, Lin, Huang & Lion (2013) examined the magnitude of the effect of text-based synchronous computer-mediated communication (SCMC) on second language acquisition (SLA). Ten experimental and quasi-experimental journal articles and doctoral dissertations published between 1990 and 2012 were analyzed. In yet another study, Abraham (2008) analyzed 11 studies of computer-mediated glosses in second language reading comprehension and incidental vocabulary learning. He

assumed that computer-mediated glosses had an overall medium effect on second language reading comprehension and a large effect on incidental vocabulary learning. He found that mean effect sizes varied from medium to large depending upon the level of instruction, text type, and assessment tasks.

Table 1. Reviews of the studies in CMC.

Reviewer	Objectives	Period	Number of articles	Main findings
Wallace (2003)	To examine the interaction among teachers and students in higher education	No date specified	100	Little work done to examine the relationship between social interaction and learning.
Luppicini (2007)	To examine the recent developments in CMC research for educational environments	No date specified	170	Partial advantages of CMC in writing, task focused discussion, collaborative decision-making, group work, and active involvement in knowledge construction during group interactions.
Lin, Huang & Lion (2013)	To examine the magnitude of the effect of text-based synchronous computer-mediated communication (SCMC) on second language acquisition	1990 and 2012	10	Text-based SCMC could make a larger difference on SLA than other means of communication. Also, intermediate learners may benefit more from SCMC tasks if they are grouped into pairs or small groups and participate in SCMC interactions on a weekly basis.
Abraham (2008)	To evaluate whether computer-mediated glosses had an overall medium effect on second language reading comprehension and a large effect on incidental vocabulary learning	No date specified	11	He found that mean effect sizes varied from medium to large depending upon the level of instruction, text type, and assessment tasks.

However, the literature reviews so far have paid less attention to the principles that are necessary to implement CMC in language learning. Therefore, a comprehensive review of

research studies on the uses of CMC in language learning is needed. The present work tries to fill in this gap regarding the current state of CMC in language learning.

3. Methodology

This review has employed several procedures in the collection and analysis of articles related to CMC implementation in language learning. First, a key word search using “computer-mediated communication”, “computer-mediated communication environments for language learning”, and “online communication and language learning” was performed in Education Resources Information Centre (ERIC), SCOPUS, EBSCO and Proquest online databases. For the key words, around 100 articles were found. The results of these studies were carefully checked. Then 40 studies were selected for the review since they matched the key words of this article and covered CMC for language learning. The criteria for selecting these studies are:

- Only peer-reviewed studies were included.
- The objective of these studies is language learning, not general education.
- Only empirical studies were included.
- No date restriction.
- Doctoral dissertations, master’s thesis, unpublished technical reports, non-refereed articles and abstracts were not included.

The selected studies were published in 10 journals, 2 book chapters and one conference proceeding.

Table 2. Journal titles and number of studies.

Title of journal	Number of articles
<i>Computer Assisted Language Learning</i>	10
<i>ReCALL</i>	9
<i>Language Learning & Technology</i>	6
<i>CALICO</i>	4
<i>System</i>	2
<i>Australasian Journal of Educational Technology</i>	2
<i>Journal of Computer Assisted Learning</i>	1
<i>American Journal of Distance Education</i>	1
<i>Foreign Language Annuals</i>	1
<i>E-Learning and Digital Media</i>	1

4. Classification of the studies

The studies of CMC implementation in language learning can be classified under the following categories.

4.1 Benefits of CMC for language learning

This section summarizes the benefits of CMC in language learning as examined by the selected research articles in the review. Warschauer (2001) pointed out that the participation in CMC is more balanced than in the face-to-face interaction which is dominated by some students. Also, Barrs (2012) examined the effect of CMC on learners' interaction to maximize target language interaction outside the classroom. The results indicated that CMC environment can offer students a convenient and useful platform on which to continue to communicate in the target language while outside of their classes. Blake (2000) analyzed the discourse produced in the chat windows to find out if they had a significant effect on language learning. The study found that CMC can provide many benefits and increased possibilities for access outside of the classroom environment.

Similarly, Zeng & Takatuska (2009) examined EFL learner's dialogues in synchronous task-based CMC. They found that CMC environments facilitated learners' text-based collaborative dialogue and enhanced their language learning. Pellettieri (2000) investigated the potential of task-based network-based communication (NBC) to foster the negotiation of meaning and form-focused interaction. The study concluded that task-based synchronous NBC, such as chatting, can indeed foster the negotiation of meaning. Learners involved in NBC chats negotiate overall aspects of the discourse.

CMC creates new opportunities for language learners to interact with each other and helps create a friendlier learning environment. Wang (2006) found that videoconferencing-supported negotiation of meaning may facilitate second language acquisition at a distance and has its own distinct features. Young (2003) assumed that CMC would make learning English more socially interactive and reduce students' affective filters. The use of the Internet appeared to motivate students and reduce their anxiety over language production. Freiermuth (2001) inferred that the students felt more comfortable in an online chat. They were less concerned about any language

deficiencies that might cause them to refrain from speaking in a face-to-face setting. Kitade (2000) explored to what extent CMC was actually a useful device for L2 learning. The results indicated that CMC provides potential benefits for learning: facilitating comprehensible and contextualized interaction, learners' self-correction, and collaborative learning environment. Xiao and Yang (2005) pointed out that students in an EFL setting never have enough English native speakers to practise their English. Their solution was the use of web conferences which can offer EFL students a chance for interaction with native speakers of English. The results of this study found that CMC involving native speaking students was superior to face-to-face interaction with nonnative peers in two regards: significantly improved fluency for the experimental group, and, to a lesser degree, improved accuracy. This study demonstrated that CMC offers superior chances for interaction and improvement to students in an EFL setting where native speakers are few.

In sum, studies show that CMC is a useful environment for language learning. It facilitates interaction between the teacher and students, and also between students themselves. It also fosters the negotiation of meaning. The students feel comfortable when CMC is used. With the help of CMC, language learners can interact with native speakers of the target language easily at anytime and anywhere.

4.2 Factors affecting CMC

It is not enough to implement CMC in language learning and wish its success. There are many factors to be considered to guarantee the success of CMC implementation in language learning. The context, modes or task type are some of these factors. Also the methodology used for language learning determines the success or failure of CMC-based instruction, as do the teachers' and learners' perceptions of CMC. The technology itself, linguistic features, curriculum and social affairs are also important factors to determine the success of CMC. The factors that have been examined by the previous studies can be studied under the following categories: the modes of CMC, task types, students' perceptions of CMC and social presence.

4.2.1 Modes of CMC

The modes of CMC (i.e., text, audio or video) have an influence on the ways language is learnt. Some research studies were conducted to explore the impact of CMC mode on language learning. Yanguas (2010) examined how learners in video and audio CMC group negotiate meaning during

task-based interaction. The participants of the study were randomly assigned to one of the three groups: video-conferencing, audio-conferencing, and face-to-face. The results showed differences in the way audio and video groups carry out their negotiations. However, the results showed no differences between video CMC and face-to-face groups and video CMC interaction patterns were shown to be more versatile.

Research studies on CMC have also investigated the impact of written CMC in comparison to oral CMC, and face-to-face classrooms. Sykes (2005) explored the strength of the connection between synchronous CMC and pragmatic instruction by measuring the effects of three types of synchronous group discussion (written chat, oral chat and traditional face-to-face). The study found that written chat groups outperformed the others in terms of both complexity and variety of strategies used.

4.2.2 Task types

The type of the task is also a crucial factor that affects the use of CMC. Brandl (2012) examined the effects of optional and required tasks on learners' quantity and quality of language use. The results showed that the optional task yielded significantly more learner output. However, students produced fewer errors when performing the required tasks than they did with the optional ones. Yilmaz & Granena (2010) examined the potential of learner-learner interaction through Synchronous Computer-Mediated Communication (SCMC) to focus learners' attention on form. The study compared two task types, jigsaw and dictogloss. The study showed that task type could affect learners' linguistic behaviour. Yilmaz (2011) tried to see if task type had any effect on the number and characteristics of focus-on-form in English as a foreign language. The results showed that the dictogloss task elicited a higher number of Language-related episodes (LREs) than the jigsaw task.

4.2.3 Students' perceptions of CMC

Students' perceptions and attitudes towards CMC can affect its implementation. Some studies have been conducted to examine this issue. Nguyen (2011) examined Vietnamese learners' reflections on and perceptions of the environment of computer-mediated communication (CMC) into collaborative learning. The majority of participants enjoyed the technology-enhanced class in general. There were approximately equal numbers of students who preferred synchronous CMC,

asynchronous CMC, or a combination of both. The students reported that the course helped improve their computer skills and collaborative experience. More involvement in learning was observed during and after the course. In addition, the participants expressed confidence that they would attend similar courses in the future and were willing to recommend this technology-embedded course to the next generations of students.

4.2.4 Social presence

Social presence is another factor in determining the effectiveness of learning. It helps increase social interaction, encourage learning satisfaction, initiate in-depth discussions and promote collaborative learning. Social presence means the degree of feeling, perception and reaction of being connected on CMC to another intellectual entity (Tu, 2002). Therefore, the uses of CMC in language learning can be affected by the learners' perception of social presence in CMC. Ko (2012) investigated the impact of synchronous CMC learning environments on learners' perception of social presence. The participants of the study were divided into three groups: video/audio, audio, and face-to-face. The study found that the learners' perception of social presence was higher in the video/audio group and lower in audio group. Yamada & Akahori (2007) argued that social presence aids second language communication in learner-centered communication.

4.3 CMC and language skills

Language skills (i.e. listening, speaking, reading and writing) can be taught and learnt with the help of CMC. In the literature, many studies examined the impact of CMC on language skills. This section summarizes some of these studies.

4.3.1 Listening

O'Bryan & Hegelheimer (2007) described a structured attempt to integrate podcasts into English as a Second Language (ESL) course on listening strategies. Preliminary evaluation of this project suggested that both the teacher and the students found the podcasts to be a positive component of the course. Absalom & Rizzi (2008) described an initial exploratory study aimed at comparing the effects of online listening and online text-based tasks. They concluded that online listening tasks in L2 required students to activate more learning resources than is the case with text-based

tasks and adopted a deep, integrative approach to learning. Also, online listening tasks in L2 could lead to greater retention of information and vocabulary and this greater retention of information and vocabulary can lead to noticeable cross modality gains. The listening group participants were better equipped to respond orally to questions about the content of the weekly tasks than the text group participants.

4.3.2 Speaking

Speaking is one of the most important skills that language teachers and students are concerned about, therefore, it received most coverage in the literature. Alastuey (2011) explored the benefits and drawbacks of synchronous voice-based CMC in a blended course of English for Specific Purposes. The results showed that achievements were significantly better in the experimental group and that there was an increase in other positive factors which may effectively contribute both to second language acquisition (SLA) and to solving many of the problems which make speaking skills the weakest skill in foreign language contexts. Shamsudin & Nesi (2006) examined the effectiveness of the chat feature of *Windows NetMeeting* as a tool for developing specified language skills. They found that students who used CMC ESP tasks made significant improvements in their oral communication skills, and also achieved higher scores than their peers in a computer science project undertaken in the semester following the treatment.

4.3.3 Reading

Fuente (2003) examined the differential effects of computer-mediated interactions and face-to-face interactions in the acquisition of L2 word meanings by learners of Spanish. Both receptive and productive as well as oral and written measures were used to assess acquisition and retention of the target items. The study suggested that computer-mediated interaction tasks where negotiation of meaning took place clearly seem to be of great benefit to help learners advance in their L2 lexical development. Murphy (2010) examined (a) whether the introduction of computer-mediated feedback better promoted quality interaction and comprehension of a web-based reading text and (b) whether CMC offered a suitable means for generating quality interaction between peers in remote locations. The results from a qualitative analysis of interactions suggested that CMC is a suitable way of generating quality interaction between students.

4.3.4 Writing

Vurdien (2013) explored how a blog as a computer-mediated tool engaged a group of English as Foreign Language learners at a language school in Spain in reflective and collaborative learning within specific writing tasks. The study found that the engagement in negotiation of meaning between peers led to better planning and more accurate choice of the right register/style required in each task prior to writing and submitting their work. Collaborative skills were also fostered through students' regular interaction in the blogs. The study suggested that for meaningful learning to take place, pedagogical intervention could encourage students to take their peers' comments into account so that they can edit their own work with a view to enhancing their writing tasks and producing mistake-free texts. Shang (2007) examined the overall effect of using email on the improvement of writing performance in aspects of syntactic complexity, grammatical accuracy and lexical density, as well as investigating the relation between the number of email exchanges and writing performance. The study demonstrated that students made improvements on syntactic complexity and grammatical accuracy as well as suggested that exchanging email messages with their peers at least four times may have a greater overall improvement on their writing performance.

4.4 The current CMC environments applied for language learning

Nowadays, many CMC environments are introduced. People can communicate via computer in many ways (i.e. written, audio and video). Skype, *MSN*, *Facebook*, *YouTube*, and *Twitter* are some examples of CMC environments used for communication by a large number of people around the world. These environments can be applied in the field of language teaching and learning. The integration of these environments creates new opportunities for language teachers and learners to be in contact even if they are out of the classrooms. Technically, each environment has its own unique features which can create something different from other resources. This section deals with different applications of CMC in language teaching and learning. It reviews the previous studies that examined how these environments were applied in language teaching and learning.

4.4.1 Skype

Skype is an Internet service that provides audio and video chatting windows. Users can set up conference calls with many people at the same time. *Skype* is a useful tool for language learning. Robert (2005) found that *Skype* offers fascinating opportunities for language professionals and learners, as they provide additional channels for oral communication. *Skype* is also an effective tool for language teachers. Suk, Young & Vrongistinos (2012) examined the nature of the *Blackboard* and *Skype*-based electronic mentoring system for beginning teachers. They found that using *Blackboard* and *Skype* together was beneficial to beginning teachers' effective teaching of English language learners. Develotte, Guichon & Vincent (2010) explored how language teachers learn to teach with a synchronous multimodal setup "*Skype*", with a particular focus on the application of a webcam during the pedagogical interaction. The study presented five degrees of webcam utilization (i.e. from non-utilization to full use of webcam). The results suggested that the last degree (full use of webcam) allowed for intense interaction and augmented the feeling of co-presence. Yanguas (2010) examined how learners in video and audio CMC group negotiate for meaning during task-based interaction using *Skype* as a tool to carry out the study. *Skype* was used by students to carry their conversations in the computer lab. The results indicated that using *Skype* for the oral CMC group created turn-taking patterns that were very close to face-to-face turn-taking.

4.4.2 Facebook

Facebook is a social networking service launched in February 2004. In language learning it facilitates the interaction between the students and the instructors and between the students themselves. The uses of *Facebook* in language learning were examined by a number of studies (e.g., Kamarul, Norlida & Zainol, 2010; Mitchell, 2012). Kamarul, Norlida & Zainol (2010) investigated if university students consider *Facebook* as a useful and meaningful learning environment that could support, enhance and strengthen their learning of English. The study found that the students believed *Facebook* could be utilized as an online environment to facilitate learning of English. Nevertheless, teachers have to integrate *Facebook* as an educational project with pre-determined learning objectives and outcomes for the learning experience to be meaningful. Mitchell (2012) explored the students' motivations for joining *Facebook*. The students in this study joined *Facebook* for social reasons. Their use over a four-week period and

the interview data showed that they were able to communicate with existing friends, learn English, and learn about American culture through *Facebook*. They were able to accomplish their goals on *Facebook* with few difficulties.

4.4.3 YouTube

YouTube is a video-sharing website, created in February 2005, which can also be used for language learning purposes. In the literature, some studies were conducted to examine the impact of *YouTube* in language learning. (e.g. Hafner & Miller, 2011; Miller, Hafner & Fun, 2012).

Miller, Hafner & Fun (2012) presented a new approach to English for Academic Purposes (EAP) course design. The students carried out a simple scientific experiment, documenting procedures, results and interpretation in the form of a digital video uploaded and shared through *YouTube*. This use of multimodal scientific documentaries as a pedagogical tool in EAP was reported with reference to data drawn from a student questionnaire, interviews with the students, and students' comments in a course weblog. The findings showed that the students perceived both linguistic and technical value in the construction and sharing of their multimodal documentaries. Hafner & Miller (2011) created a student-centered digital video project, in which students created and shared a multimodal scientific documentary. A range of new technologies and Web 2.0 platforms (including *YouTube* and *Edublogs*) were integrated into the project process in order to create a technologically rich learning environment. They drew on the students' accounts (from questionnaires, focus group interviews, and Weblog comments) to evaluate the digital video project and associated technological environment.

4.4.4 Wikis

The implementation of wikis in language learning has also received some attention in the recent years (e.g., Castaneda, 2011; Mak & Coniam, 2008; Zorko, 2009). Castaneda (2011) investigated the differences in levels of achievement between students who used instruction with video/photo blogs and wikis, compared to those who used instruction with traditional text-based technologies. The results revealed that there were no significant differences at the production level between the students who used video/photo blog and wiki technologies vs. those who used traditional technologies. However, significant differences were found at the recognition level for the group that used video/photo blogs and wikis when compared with those who used traditional

technologies. The general mean results revealed that the groups using video/photo blogs and wikis outperformed those who used traditional technologies.

Mak & Coniam (2008) investigated authentic writing through the use of wikis. The wikis were used as a collaborative writing platform to produce content that describes the different facilities and features of their school. The students' final draft became a printed brochure of their "new" school to be distributed to parents. In the light of this real "outcome", the paper discussed the place of authentic writing, situated within the domains of creativity and task-based learning, in a school's ESL programme. The results indicated that wiki could have two significant impacts to improve writing skills. First, the task's real outcome boosted students' confidence as writers. Second, it tapped students' creative skills. Another outcome worthy of note was that of peer review in writing – a novel concept for the students who participated in the project.

Zorko (2009) explored the factors that affect the ways students collaborate in the wiki environment. A qualitative exploration of students' perceptions of collaboration in the wiki was carried out among sociology students at university level who used this environment in blended, problem-based learning as part of their "English for Specific Purposes" course. The research showed that the wiki promoted much collaborative behaviour among students, such as learning from each other and communicating with the teacher. However, the data indicated that the wiki was less successful in facilitating other types of collaboration, such as communicating with peers and co-constructing products. Overall, the results obtained here confirmed that the wiki can be used to enhance effective collaboration in a constructivist approach to language learning.

Stickler & Hampel (2010) asked some learners to take part in an intensive online course offered to intermediate level students. The course piloted the use of a *Moodle*-based virtual learning environment and a range of new online tools which lend themselves to different types of language learning activities (e.g. wikis for collaboration and blogs for reflective learning). The study showed that an online language course can combine different approaches to learning and teaching, such as using language communicatively and focusing on form and language practice.

Elola & Oskoz (2010) explored L2 learners' approaches to the writing task in wikis. They also examined learners' collaborative synchronous interactions when discussing content, structure and other aspects related to the elaboration of the writing task. Analysis of the data showed that while statistically significant differences were not evident in terms of fluency, accuracy and complexity, the comparison of individual and collaborative assignments revealed observable

trends that indicated how learners' interactions with the text differ when working individually or collaboratively. Furthermore, a closer analysis of learners' approaches to collaborative writing through the use of social tools showed that wikis and chats allowed them to concentrate on writing components in a different, yet complementary, manner depending on whether they interacted in the wikis or in the chats.

Lund (2008) found that wiki held the potential for collective knowledge advancement and language development. Bradley, Lindström & Rystedt (2010) investigated what wikis could do as a means to enhance group interaction when students were encouraged to participate in constructing text and exchanging peer response. The study showed that collaboration became specifically interesting from a language learning perspective. On the student wiki pages there were numerous contributions relating to both local language and global content. Pellet (2012) proposed a social-constructivist model that integrated CMC and collaborative learning to teach content-based courses using wiki as a medium. The study suggested that the "read-and-write" Internet offers a unique medium for constructive learning approaches, which together can help students develop learner autonomy and metacognitive skills.

4.4.5 Blogs

Blogs have some benefits to language learning, which have been examined by some studies (e.g. Hsu, Wang & Comac 2008). They investigated how the use of audio blogs can help to meet the instructor's need to improve instruction in English as a second language (ESL). The instructor used audio blogs to manage oral assignments, interact with learners, and evaluate performance outcomes. The results indicated that the use of audio blogs met the instructional needs, providing an efficient and effective way to evaluate students' oral performance and permitting individualized oral feedback. In addition, learners enjoyed the ease of using audio blogs and believed that audio blogs assist their language-learning experience.

Recently, almost every month new technology is introduced. This creates challenges for researchers to pretend that one can capture the snap-shot of the area. New technology, issues, methods, and topics are constantly emerging. Hence there is no denying that there are many other environments that can be used for language learning. They are not extensively discussed in the present paper yet some of them are mentioned as examples. Emails, *MSN*, *Twitter*, *Flicker*, *MySpace*, and much more are used for communication and can be valuable for language learning.

5. Discussion and suggestions for future research

The first question of this study addressed the general factors affecting the implementation of CMC in language learning. The studies reviewed here have explored the factors that affect CMC implementation in language learning. Looking back at the previous studies, one can notice that they have generally neglected the ways in which teachers can integrate these CMC environments and organize suitable tasks or principles of using CMC. Instead, these studies focused on the benefits and factors affecting CMC. As Chapelle (2003) points out, the profession needs principles that can be applied, studied, and developed. Therefore, further studies are necessary to determine the principles that are required to implement CMC in language learning.

The second question of this study addressed the uses of CMC in teaching language skills. This review shows that some of the previous studies have examined the benefits of CMC in comparison to traditional face-to-face classrooms. These studies have examined the benefits of CMC in teaching language skills (listening, speaking, reading, and writing).

The third question of this study addressed the current CMC environments used for language learning. Such examples of CMC environments as *YouTube*, wikis, and *Facebook* and their use in the field of language learning were presented in a considerable body of research. However, some issues are still not fully examined. According to Chapelle (2003), there is potential for studies that would provide some evidence about the design of the software, the learners' use of CALL, or the way that the teacher has organized the task.

In the literature, each environment was examined in isolation in terms of its uses and benefits for language learning. Therefore, the author of this review suggests that there is a need to examine how language teachers can actually utilize the CMC environment effectively. The current CMC resources can be compared in order to find out which ones can be useful for language learners and assist the instruction of all the language skills. In other words, which CMC environment can be used for all language skills. Therefore, this review suggests that future research should be conducted to find out which environment will be more useful for language learning.

6. Conclusions

Studies on CMC have contributed to the body of literature which indicated the benefits of CMC in language learning. These studies have shown how CMC environments can be used to enhance language learning. The factors affecting the use of CMC in language learning were explored by a good number of studies. Current CMC environments were examined to find out how they can be integrated into language teaching and learning. However, the literature paid no attention to some specific topics. This review suggests further studies to investigate how language teachers can integrate CMC environments and organize suitable tasks. Also, further studies are necessary to determine the principles that are required to implement CMC in language learning.

The findings of this review will help language learning researchers to find out the areas that were not fully examined in the literature. However, there are certain limitations. The first one concerns the topics discussed in this review. Although it has discussed many topics under five major categories, it fails to mention some research issues, for example, the theories used to explain the nature of CMC (i.e. cognitive and socio-cultural). The second one concerns the period of the studies reviewed. All studies were published between 2000 and 2013 and it would be better if no specific period of time was determined. In spite of these limitations, this review hopefully makes a sound contribution to the field of CMC.

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