CHAPTER 1

Introduction

1.1 Computer Technology

Recent developments in computer technologies have opened new horizons in the teaching and learning of languages. More than three decades ago, computers and related information technology were first introduced to educators as educational tools (Kosakowski, 1998). In the last few years, computers have become indispensable tools in education; they have become as much a part of academic life as pen and paper were in the past (Vass, 1998). Consequently, as in other academic areas, research is now concerned with exploring means of integrating computer technology more effectively into the teaching and learning of languages to enhance second language learning. The advent of networked computing in the 1990s provided important new ways of using computers in the second language classroom.

A generation ago, second language teachers were concerned with teaching their students how to write essays and read journals and online materials. Nowadays, they are also concerned with teaching them how to write email messages and conduct research on the web (Warschauer & Meskill, 2000). This has resulted in the emergence of a new approach, which emphasizes the role of computer technologies as a medium of communication, rather than simply being a teaching tool (Warschauer & Meskill, 2000). As a new medium of communication, computer technologies create opportunities for authentic and meaningful interaction inside and outside the second language classroom and they provide the students with tools for exploring the target language (Warschauer & Meskill, 2000). For this reason, integrating computer
technologies, as a medium of communication, should be an important goal of language programs (Warschauer & Meskill, 2000), as it may contribute to more effective learning.

Educators have realized that effective use of computer technology can enhance student learning (Liu et al., 2003). This is especially true because new online technologies match well with recent teaching and learning approaches in which the students are viewed as active participants in the learning process, rather than being empty vessels that are to be filled with knowledge (Warschauer & Meskill, 2000). Computer technologies are meant to maximize student engagement, autonomy and empowerment in the classroom, and not simply to perform classroom tasks and activities more efficiently (Warschauer & Meskill, 2000). The growing understanding of the potentials of computer technology has encouraged a shift in emphasis from computer technology to its applications (Liu et al., 2003). One of the applications of computer technology is Computer-Mediated Communication.

1.2 Computer-Mediated Communication (CMC)

The term Computer-Mediated Communication (CMC) was coined by Hiltz & Turoff (1978, cited in Murray, 2000) in their classic study of computer conferencing. They used the term to refer only to this mode of electronic communication, i.e. computer conferencing. Currently, the term CMC is used to refer to the process of communication, reading and writing via networked computers (Warschauer, 2001). It includes a wide range of different means of communication using the computer as a medium, either in the form of synchronous or asynchronous communication. Synchronous CMC is real time communication, i.e. the participants are online at the same time and respond to one another immediately. Modes of synchronous CMC
include chatting, real time discussion or online conferences. Asynchronous CMC is a delayed mode of CMC where participants communicate with each other at different times, i.e. the participants do not have to be online at the same time. Modes of asynchronous CMC include email communication, bulletin boards and delayed discussion (Warschauer, 2001). CMC does not, however, include spoken language modes such as “voice-to-voice technologies” that could involve speech synthesis or text recognition (Murray, 2000). CMC can also be in the form of one-to-one, many-to-many or combinations of both (Warschauer, 1996b). In other words, any individual member of a group may initiate interaction with any or all of the other members (Warschauer, 1997).

1.3 Statement and Rationale of the Problem

English teachers consider writing to be a crucial activity in measuring students’ academic success (Hertz-Lazarowitz & Bar-Natan, 2002). As reported by a number of EFL teachers, writing represents a serious problem for most EFL learners. Egyptian EFL learners are no exception. The students face many problems when it comes to grammatical accuracy in writing. Anecdotal reports from teachers interviewed in a pilot study conducted by the researcher in April 2003 (see Section 3.7) indicated that there was a gap between students’ knowledge of grammatical rules and application of these rules in language use. Students learn new grammatical rules by heart, but when it comes to practice, especially in writing where grammatical accuracy is normally expected, they are largely unable to put their knowledge of grammar to work. Students receive explicit grammar teaching for years, but it seems to have no substantial impact on improving their grammatical accuracy. Arab learners of English as a Foreign Language (EFL), especially university students, continue to
make basic errors in syntax after years of studying English (Rababah, 2003). Students have problems using English correctly either in the classroom or outside the classroom when they are required to do so (Rababah, 2003). Grammatical errors tend to fossilize, and this may result in permanent lack of accuracy and lack of improvement in their grammatical competence, which is an important component of their overall communicative competence (Rababah, 2003).

Lack of grammatical accuracy may also hinder students’ academic development, especially if they major in English or are studying in an English-medium university. In fact, teachers often complain about the weak grammatical competence of school graduates who join universities either as English language learners or English majors (Rababah, 2003). In addition to needing grammar skills for academic purposes, students also need such competence to qualify for jobs that require high-proficiency in English. Therefore, there is a real need to explore new techniques in the foreign language classroom to help the students overcome lack of grammatical accuracy.

Exploring the potentials of CMC in EFL writing might help Egyptian students improve the grammatical accuracy in their written output. The use of CMC might provide students with extra practice in writing. CMC, as network exchanges, is text-based and the learners must express their ideas by producing texts, which essentially contain grammatical structures. This represents an example of the forced output (Blake, 2000), which is identified by Swain (1985) as an important factor in promoting the grammatical competence of the learners. Forced output can help students test their hypotheses in grammar. In this process, the learners can engage in grammatical analysis, which is essential for accurate production (Swain & Lapkin, 1995). Besides, in CMC the students will communicate with real audiences and for
authentic purposes. Thus, the learners’ attention can be drawn to problematic syntactic forms, while working towards authentic communicative goals (Chapelle, 1997).

1.4 Purpose of the Study

The present study examined the potential of CMC in promoting grammatical accuracy in L2 writing. The study aimed to investigate whether the use of asynchronous CMC, as compared with Paper-and-Pencil Discussion (PPD), had an effect on the grammatical accuracy of the subjects. Only one mode of asynchronous CMC was examined, namely Delayed Computer-Mediated Discussion (DCMD). DCMD provides the students with an authentic purpose for communication, which could raise their personal involvement and engagement (Strambi & Bouvet, 2003) and, in turn, motivation. It also promotes meaningful interaction, which requires the learners to comprehend input and produce an edited output (Stockwell & Harrington, 2003).

DCMD constituted the treatment in the present study, which was conducted as a supplementary activity to classroom teaching. The subjects in the experimental group participated in DCMD, whereas the subjects in the control group participated in PPD. The aim was to explore the effect of the DCMD mode and the PPD mode of text production on grammatical accuracy. The written products of the subjects were compared before and after exposure to these two different modes of writing to examine the effect of each on grammatical competence.

1.5 Research Question

The present study investigated the following research question:
What is the impact of delayed computer-mediated discussion on grammatical accuracy of Egyptian EFL learners’ writing?

For the purpose of this study, grammatical accuracy in Egyptian EFL writing was examined only with regards to the following grammatical features:

1. Subject/verb agreement
2. Articles
3. Prepositions
4. Tenses

The choice of the above-mentioned grammatical features for investigation in the present study was based on the pilot study conducted by the researcher in April 2003 at the American University in Cairo (AUC) (see Section 3.7). In this study, it was observed that subject/verb agreement, articles, prepositions and tenses were the grammatical features with the highest frequency of errors made by the English Language Institute (ELI) students who participated in the pilot study. Informal talks with some ELI teachers also supported the choice of these grammatical features as problem areas. The proficiency level of the subjects who participated in the present study, namely second year students at the Faculty of Nursing, was much lower than that of ELI students. Accordingly, it was expected that these same features would represent even more serious problems for the target subjects. Besides being problematical, the chosen grammatical areas are basic grammatical features that are required in all academic writing.

1.6 Definitions of Variables

a. The dependent variable is grammatical accuracy, represented by each of the following features: Subject/verb agreement, articles, prepositions and tenses.
b. The independent variable in the study is the Delayed Computer-Mediated Discussion (DCMD).

### 1.7 Theoretical Definitions of Terms

#### 1.7.1 Computer-Mediated Communication (CMC)

Following Warschauer (2001), Computer-Mediated Communication (CMC) is a term used to refer to the process of reading and writing via networked computers, in both synchronous and asynchronous modes.

#### 1.7.2 Synchronous CMC

Synchronous CMC, also known as real time CMC, is a means of communication in real time, where the participants are online at the same time and respond to one another immediately. Synchronous CMC modes include real time discussion, chatting and online conferences (Warschauer, 2001).

#### 1.7.3 Asynchronous CMC

Asynchronous CMC, or delayed CMC, is a mode of CMC where participants communicate with each other at different times, i.e. the participants are not online simultaneously. Asynchronous modes of CMC include email communication, bulletin boards and delayed discussion (Warschauer, 2001).

#### 1.7.4 Paper and Pencil Discussion (PPD)

Paper-and-Pencil Discussion (PPD) is defined, for the purpose of the study, as discussions that take place between students in a hand-written format. In small groups, the students read and respond to each other’s contributions in a shared
Delayed Computer-Mediated Discussion (DCMD) is a written discussion that takes place via computer networks, but in a delayed time fashion (Warschauer, 2001). DCMD is also referred to as asynchronous or threaded discussion, which are common terms used in the literature.

The term “Delayed” is used in the present study to refer to contributions that are not sent on the spot, i.e. the students in both the experimental and control groups, posted their contribution to the discussions whenever ready during the assigned time.

1.7.6 Grammatical Accuracy

A definition of grammatical accuracy is adapted from Buck et al. (1989, cited in Gonzalez-Bueno & Perez, 2000) as the acceptability and precision with which the students will use certain grammatical features in their writing. These grammatical features are: Subject/verb agreement, articles, prepositions and tenses (defined in the scoring rubric in Appendix A). It is worth noting that the grammatical feature of tenses includes a minimum of twelve tense/aspect forms. It was not necessary to limit the focus of investigation in the present study to specific forms because the range of the forms used was expected to be naturally limited by the low proficiency level of the participants. It was not expected that they would produce a variety of forms. Besides, specifying certain tenses might have very much limited the definition of grammatical accuracy as investigated in the study.
1.7.7 Second Language Learning

According to Gass & Selinker (2001), second language learning generally refers to “the learning of a nonnative language in the environment in which the language is spoken” (p.5), whereas foreign language learning refers to “the learning of a nonnative language in the environment of one’s native language” (p.5). However, in the area of CALL, this distinction is not made anymore in the literature. Accordingly, in the present study the term second language learning subsumes foreign language learning. Only in places where the distinction has significance, will the terms be used as defined by Gass & Selinker (2001).

1.8 Delimitations

a. Of all delayed modes of CMC, only DCMD was the focus of research in the present study.

b. Investigation of grammatical accuracy was limited to the specified grammatical structures, namely subject/verb agreement, articles, prepositions and tenses. Only these structures were examined in the study.

1.9 The Importance of and Need for the Study

Exploring innovative ways to help EFL learners acquire grammatical accuracy more effectively represents a vital need in the Egyptian educational setting. Writing via CMC can create an authentic purpose and the participants in the discussion represent a real audience for writing, which are elements that are often lacking in writing assignments in the traditional writing class (Li, 2000). When the students are given the opportunity to discuss topics online, they are motivated to improve their writing skills to meet the demands of the authentic task (Ortega, 1997). CMC, when
employed in the ESL classroom, also emphasizes social and affective factors that are important in SLA by promoting students' interest in the functional use of the language (Warschauer, 1996b). Besides, it provides the learners with a less threatening environment of communication as compared to the traditional classroom (Warschauer, 1996b). It could be expected that these characteristics of CMC, DCMD included, might help Egyptian EFL writers improve their grammatical accuracy.

DCMD might have an effect on improving grammatical accuracy because, unlike PPD, it carries the benefits of traditional classroom discussion while incorporating the many advantages of CMC. Besides, it also has the benefits of writing via computers. Writing with computers results in fewer errors and more correct work, as compared to paper-and-pencil writing (Grejda, 1992 cited in Hertz-Lazarowitz & Bar-Natan, 2002). A meta-analysis conducted by Goldberg, Russell & Cook (2003) reported that the results of six studies showed that students made more revisions to their writing when using word processors as compared to paper-and-pencil. In the same meta-analysis, the findings of 15 studies indicated that students who write with computers, i.e. word processors, tend to produce passages with a higher quality than those who write with paper-and-pencil.

Anecdotal reports by teachers show that editing output is much easier in DCMD than in PPD, with a mouse-click, the students can delete words, lines or whole paragraphs, and they can easily re-organize paragraphs or whole essays. Visual processing of output is also better on screen in DCMD. The ease with which revision can be carried out on screen seems to encourage the students to proofread more (Abdullah, 2003). The learners can make their output more salient by using the available options to display portions of text in color, in italics or in bold or with underlining. The students can also specify font type, size and color.
Some studies in the literature lend support the effectiveness of DCMD in developing grammatical accuracy. Gonzalez-Bueno (1998) compared asynchronous journals to paper-and-pencil journals, which are somewhat comparable to DCMD and PPD, and found that the language used in the asynchronous journals is characterized by the accuracy and coherence of the written modality. Some of the subjects in Gonzalez-Bueno’s study reported that electronic dialogue journals helped them to monitor their accuracy before sending messages. The study identified the use of higher levels of language accuracy as one of the features of the foreign language generated in electronic journals.

In terms of research, there is need for empirical investigations that address which aspects of writing skills are fostered in CMC and which are hindered (Ortega, 1997). Despite the increasingly popular use of CMC for language teaching and learning, systematic investigations of the impact of this new medium of communication and instruction on students’ writing are scarce (Li, 2000). More research needs to be done to identify the most effective means of incorporating CMC in the writing classroom to help teachers adapt to the changes caused by CMC (Vass, 1998). Besides, to my knowledge, no study has attempted to examine the impact of CMC on the writing of Egyptian EFL learners. Therefore, it is hoped that the present study would fill a gap in the literature and have potential implications for future uses of CMC in the learning of English as a foreign language. The findings of the present study might expand the generalizations made in previous studies and the theoretical propositions about how CMC can be integrated in the classroom to facilitate second language learning.
CHAPTER 2

Literature Review

2.1 Introduction

Second language teachers began to integrate CMC into language teaching in the late 1980s (Warschauer, 1996b). CMC is considered "the most revolutionary development in computer-assisted language learning, since it is the only one which involves direct human-to-human communication rather than human-to-machine" (Warschauer, 1996b, p.30). It facilitates text-based, place-independent and many-to-many discussion (Warschauer, 2002).

With the rapid development of computer technology, CMC has been increasingly incorporated into foreign language classrooms (Zhang, 2002). It is considered an innovative way to increase foreign language use inside and outside the classroom (Gonzalez-Bueno, 1998). As an expansion of CALL activities, CMC has been used in the foreign language classroom in the form of email, computer conferencing, electronic discussion groups and electronic bulletin boards (Son, 2002). Email and asynchronous conferences are considered the most common forms of CMC incorporated into the language classroom (Peterson, 1997).

CMC started to represent a useful pedagogical tool in the field of teaching English (Warschauer, 2001) because it provides opportunities for meaningful human interaction that can promote the language learning process (Liu et al., 2003). This is true especially because modern approaches to language teaching emphasize the role of interaction and communication in authentic contexts in promoting SLA. This is the reason why language teachers have found CMC projects to be beneficial (Warschauer...
2.2 Computer-Mediated Communication and Second Language Learning

Several advantages of CMC in the foreign language classroom have been reported in a number of studies in the literature. CMC has changed the language learning environment as well as the dynamics of the language classroom (Li, 2000). Language learning that takes place in CMC has led to classrooms that are more social, collaborative and communicative (Li, 2000; Warschauer, 1997). CMC gives the students the opportunity to learn and use the target language naturally and with communicative purposes. It provides an interactive learning environment that generates high levels of interactivity and increases opportunities for authentic use of the target language (Chun, 1994; Li, 2000; Sotillo, 2000). Students are motivated to improve their language skills in order to meet the demands of this authentic medium of communication (Ortega, 1997).

CMC has an equalizing effect on students' patterns of participation, allowing students who are shy, reserved or less likely to volunteer in class equal opportunities to participate in CMC (Kelm, 1992; Kern, 1995; Warschauer, 1996a; Warschauer & Meskill, 2000). Besides, in the absence of physical or other nonverbal cues in CMC, as opposed to the classroom setting, the learners become more dependent on linguistic cues to encode meaning (Stockwell & Harrington, 2003). Thus, it focuses the learners’ attention on linguistic features. However, it also maintains the functional focus that characterizes oral interaction. (Stockwell & Harrington, 2003).

CMC shifts the emphasis from teaching to student learning. It encourages a learner-centered approach where the students, and not the teacher, dominate the floor,
as opposed to traditional classroom instruction (Warschauer, 1997). There is a more
decentralized role for the conventionally dominant teacher in a CMC environment. It
creates new roles for both teachers and learners (Byrnes, 1996 cited in Gonglewski,
1999). The role of the teacher as an authoritative source of knowledge and expertise is
transformed to that of a mere participant engaged in equal learning partnership with
learners (Kern, 1995; Warschauer, 1997). Teachers transform from the so-called
“sage on the stage” to “guide on the side” (Kost, 1999). CMC also fosters learner
autonomy where the students are in control of the content and the process of their own
learning (Li, 2000), which is viewed as an important element in language learning.

CMC challenges the traditional view of the classroom as a purely same time-
same place entity (Paramskas, 1999 cited in Stockwell & Harrington, 2003). CMC
can be conducted as an out of class activity, and so it increases the students' opportunities to communicate in the target language (Warschauer & Meskill 2000). Increased opportunities of practicing the target language are very beneficial, especially in foreign language settings where students rarely use the language outside the classroom. In fact, using language both within and beyond the classroom setting is one of the five goals established by the recently developed Standards for Foreign Language Learning (Gonzalez-Bueno, 1998). In view of the above-mentioned advantages of CMC, Sotillo (2000) anticipated that future studies that examine the impact of various modes of CMC on language acquisition would form part of the research agenda for the 21st century.

However, the growing interest in CMC has not yet been matched by the research agenda it demands (Warschauer, 1997). Though CMC has been increasingly part of the English classroom for over ten years, relatively little research is available regarding the overall language gains of the students who used CMC (Ortega, 1997).
There is an acute need for empirical research on the potential effects of CMC on students’ language acquisition (Biesenbach-Lucas & Weasenforth, 2000) because little is known about the efficacy of CMC in the development of target language proficiency (Stockwell & Harrington, 2003). Moreover, very little has been published on the evaluation of the effectiveness of CMC in the context of online CALL discussion groups or CALL courses (Son, 2002). Few researchers have studied the language of CMC, especially as it relates to English language learning (Murray, 2000). On the other hand, while a large number of studies have been conducted on Spanish, German and French (e.g. Gonzalez-Bueno, 1998; Chun, 1994; Beauvois, 1992), very little research has been conducted in “non-English-dominant countries” (Murray, 2000), as in the Egyptian setting.

A number of recent studies have proposed that CMC represents an ideal medium for promoting L2 acquisition (Salaberry, 2000). However, research findings are largely inconsistent and conflicting because most of the existing body of literature is based merely on observations of the use of CMC in language classrooms (Vass, 1998), which are no more than “impressionistic documentations” (Ortega, 1997, p.84). It largely consists of innovators reporting on the general outcomes of their teaching (Warschauer, 1997). Besides, the existing systematic studies in the literature focus on few aspects of language such as the outcome of particular class sessions (e.g. Kern, 1995) or students' use of particular discourse features (e.g. Chun, 1994). Most of the studies in the literature have analyzed the functions and the content/context of the written language produced via CMC (Gonzalez-Bueno & Perez, 2000), but almost no study has attempted to examine its impact on the academic writing of the learners. In addition, in the short two-decade history of CALL, CMC researchers have primarily used case study methodology (Murray, 2000), which does not provide
enough information about the potential of the medium.

A number of studies (e.g. Beauvois, 1992; Chun, 1994; Kelm, 1992; Kern 1995, Sullivan & Pratt, 1996) provide useful descriptive information, but problems in the research methods obscure the interpretation of the findings (Ortega, 1997). For example, in some studies (e.g. Kern, 1995; Sullivan & Pratt, 1996), the research methods were not appropriate. The researchers used measures of language productivity that are difficult to interpret, e.g. length of learner output in terms of number of words, sentences, and turns. It is difficult to interpret these measures because of the lack of controlled comparisons with face-to-face language production under equivalent conditions, such as number of participants, the presence or absence of teacher participation (Hee-Jung, 2003).

Evaluating the potentials of CMC for second language learning and language development requires analyses based on quantitative measures and careful documentation (Ortega, 1997). Appropriate empirical research methods should be used to investigate how CMC can be used to improve instructed SLA (Chapelle, 1997). A broad research agenda is therefore called for to gain a more in-depth understanding of the potentials of CMC (Liaw, 1998), and to help English teachers and learners to make the best use of it.

According to Ortega (1997), it is difficult to evaluate the potentials of CMC because of the scarcity of available research and also because of the lack of theoretically based approaches that guided the few existing analyses. CMC suffers from a lack of extensive theoretical background (Gonzalez-Bueno, 1998). Empirical evidence supporting the characteristics of CMC needs to be drawn from a sound theoretical background in SLA (Ortega, 1997).
2.3 Computer-Mediated Communication (CMC) and SLA

According to Sotillo (2000), CMC technology has the potential to enhance SLA insofar as it draws on and emphasizes some of the principles expressed in SLA theories. Three SLA principles form the theoretical background of the present study, namely the role of interaction in L2 acquisition, the role of output in L2 acquisition and SLA principles that advocate focus on form. The following sections report on the importance of the role of interaction, the role of output and focus on form in SLA theories. It will also show how these principles are fostered in CMC.

2.3.1 The Role of Interaction

It is widely recognized that authentic interaction plays a crucial role in L2 development; it is a fundamental issue in SLA (Long, 1996 cited in Stockwell & Harrington, 2003). Scholars seem united in maintaining that the language learning environment should provide opportunities for learners to engage in interaction (Doughty & Pica, 1996 cited in Strambi & Bouvet 2003). According to Chapelle (1997), interaction promotes L2 acquisition because it provides opportunities for learners to:

1. Comprehend the message, and in the process of comprehending the message, learners need to acquire the L2 forms that encode the message.
2. Produce modified output, which helps them to develop certain aspects of their morphology and syntax.
3. Pay more attention to L2 forms, which can help them, in the process, to develop their linguistic system.

That is why the pedagogical goal of CALL activities, including CMC, is for
learners to improve their ability in the target language by participating in linguistic interactions (Chapelle, 1997). CMC provides the learners with chances of meaningful interaction in the target language, and generates high levels of interactivity (Sotillo, 2000). The learners can engage in authentic communication with native speakers and other learners in different parts of the world (Warschauer, 1996b). CMC encourages the formation of electronic communities of learners (Sotillo, 2000). It helps the learners to perceive language as "a medium of communication" and not "an object" (Ortega, 1997, p. 82). The students are motivated to improve their writing skills in order to meet the demands of this authentic medium of communication (Ortega, 1997).

2.3.2 The Role of Output

Even though providing the students with comprehensible input is necessary to the overall process of language acquisition, comprehensible input alone is not sufficient for language acquisition to take place (Sotillo, 2000). Output is also essential in promoting language acquisition. Learners should have opportunities to produce target language output (Swain & Lapkin 1995). “Output represents more than the product of language knowledge, it is an active part of the entire learning process” (Gass & Selinker, 2001, p. 410). Learners’ output is often equated with grammar because language production may force the learners to move from semantic processing to syntactic processing (Gass & Selinker, 2001). The syntactic mode of processing helps learners to internalize new forms (Pica, Holliday, Lewis, Morgan & Thaler, 1989 cited in Chapelle, 1997) and to improve the accuracy of their grammatical knowledge (Nobuyosha & Ellis, 1993 cited in Chapelle, 1997). Output, thus, seems to have a potentially significant role in the development of syntax (Swain
According to the output hypothesis (Swain, 1985), learners need opportunities for “pushed output”, such as writing in order to develop specific grammatical features that do not seem to be acquired solely by learning to comprehend input. The learners are pushed to stretch their grammatical system to make themselves understood, i.e. to produce comprehensible output (Gass & Selinker, 2001). Learners need to be “pushed toward the delivery of a message that is not only conveyed, but that is conveyed precisely, coherently and appropriately (Swain, 1985, p.249).

Moreover, output promotes noticing, which is an important factor in language acquisition (Swain, 1998). Swain & Lapkin (1995) explain that in producing output, the learners will be given more opportunities to notice their linguistic problems. Noticing a problem pushes the learners to modify their output. This encourages the students to adjust the linguistic forms of their utterances, i.e. make them more accurate to render their output comprehensible (Strambi & Bouvet, 2003). The learners’ unsuccessful attempt at expression is followed by modification of what is perceived as problematical. This is the reason why some researchers identified forced output as an important factor in promoting second language acquisition (Blake, 2000).

The use of CMC can provide the necessary opportunities for pushed output, thereby leading to stretching the learners’ linguistic resources (Sotillo, 2000). CMC is a text-based medium where the learners must express their ideas by producing texts containing grammatical structures. This represents an example of the forced output (Blake, 2000), which can help the learners to test their hypotheses in grammar. Learners try out new language forms and structures in an attempt to stretch their interlanguage to meet the required communication needs (Swain, 1985). In so doing, the learners can engage in grammatical analysis, which is essential for acquisition...
(Swain & Lapkin, 1995). When the learners encounter difficulties in producing the language in CMC, they become aware of gaps in their grammatical knowledge, even when external feedback is unavailable to them (Swain & Lapkin, 1995). Besides, on producing output in CMC, the learners can also get external feedback about what is ungrammatical (Long, 1996 cited in Strambi & Bouvet, 2003), especially if their production results in miscommunication. This encourages the students to adjust the linguistic forms of their utterances, i.e. make them more accurate to make their output comprehensible (Strambi & Bouvet, 2003). This is especially because the learners are communicating in authentic contexts where grammatical inaccuracies might not be tolerated because they might hinder communication.

CMC emphasizes the sharing of ideas, the students attempt to produce many language structures that might be otherwise not used or even avoided (Kern, 1995). The students are obliged to use a wide range of forms and grammatical structures to communicate their ideas. Once the students produce these structures, they can see their own language errors and how they affect communication. The students are able to focus on specific ways that can make their language better in order to communicate more effectively (Kern, 1995). Thus, the learners’ attention is drawn to problematic syntactic forms, while working towards communicative goals (Chapelle, 1997).

2.3.3 Focus on Form

Attention to form is beneficial in the second language classroom (Doughty & Williams, 1998). When classroom second language learning is entirely meaning-focused, some linguistic features do not develop to target-like competence (Doughty & Williams, 1998). Language processing at the level of meaning cannot serve the purpose of understanding the syntax of the language. Knowledge of syntax is essential
to the production of language (Gass & Selinker, 2001). There is a need to develop meaning-focused activities into which attention to form is embedded (Gass & Selinker, 2001), especially since focus on form entails a prerequisite engagement in meaning before attention to linguistic features (Doughty & Williams, 1998).

Salaberry (2000) points out that learners must be prepared to revise and pay attention to form as well as meaning. A meaning-focused approach might be efficient. However, it may rely on an underdeveloped L2 system and it will perhaps prevent further development of L2 (Salaberry, 2000). Focus on form may be necessary to push the learners beyond communicatively effective language toward target-like second language ability (Doughty & Williams, 1998). Research on negotiation of meaning suggests that focus on form has a positive influence on interlanguage development (Doughty & Williams, 1998). The learners can focus on form by correcting their linguistic errors (Chapelle, 1997). It is worth noting that focus on form and attention to meaning are not always mutually exclusive. During a meaning-focused interaction, focus on form could occur by a shift of attention to the linguistic codes that are used to convey the message (Long & Robinson, 1998). Most researchers agree that a balance should be established between focus on meaning and form to promote both fluency and accuracy (Strambi & Bouvet, 2003).

Communication and interaction are important features of CMC, but research should not be limited to the potentials of CMC in these areas (Salaberry, 2000). CALL activities, including CMC, can promote learners’ dual concern for communicating linguistic meaning, i.e. fluency, while attending to and correcting their linguistic form (Chapelle, 1997). CMC can help the learners to convey meaning by engaging in authentic interaction. It can also help the learners to focus on form by providing them with more time, compared to face-to-face interaction, to plan and edit
their writing. They can work towards a communicative goal, such as discussing a
certain topic, but they can also focus on form by noticing their linguistic problems and
editing their output (Chapelle, 1997).

2.4 CMC and Second Language Writing

Computer-Mediated Communication (CMC) has been employed in helping
develop students’ writing in both L1 and L2. L1 composition teachers are considered
among the first advocates of using CMC for educational purposes. They have used
computer conferencing in their classes to engage the students in collaborative writing
and encourage the production of knowledge as a social activity. The same computer
conferencing techniques have been adapted in second language classrooms to teach
writing and promote the development of language as a whole (Warschauer, 1996a).
Currently, the incorporation of CMC has become more popular among second
language teachers. Teachers employ it because it helps the students to communicate
with native speakers and other learners in different parts of the world (Warschauer,
1996a). Writing via CMC provides the learners with an authentic purpose and
audience for writing, which are elements often lacking in the writing assignments of
traditional writing classes (Li, 2000). In traditional writing classes, the teacher is the
only audience and evaluator of the students’ writing and the purpose of writing is
mainly that the students follow the teachers’ demands, which themselves reflect the
academic goals of the course.

CMC employs the mode of writing so the students are given more time to plan
than in oral communication (Warschauer & Meskill, 2000). The students can decide
when to contribute and can prepare their text without the time pressure in oral
interaction (Strambi & Bouvet, 2003). This results in language that is more complex
than oral communication in terms of the lexical and the syntactic features (Warschauer & Meskill, 2000). This reflects the fact that CMC is a text-based medium that helps the students to pay more attention to linguistic form (Warschauer, 1997). The students are given better opportunities to notice the linguistic input; they can learn new linguistic aspects and produce them in their output (Warschauer & Meskill, 2000). CMC also provides a stimulus that encourages the students to increase their L2 written production (Kern, 1995).

CMC, furthermore, provides the learners with a non-threatening environment in which to experiment with the language (Pennington, 1996). CMC helps the learners to practice the language in a less stressful environment (Chun, 1994), which is free of oral interaction constraints, such as fear to interrupt or of being interrupted, and the need to manage the floor and exchange turns (Ortega, 1997). Thus, it relieves the learners from considerations of saving face, which can heighten anxiety (Stockwell & Harrington, 2003). This results in a better learner disposition towards engaging in the activities and positive perceptions of the learning environment (Strambi & Bouvet, 2003). Accordingly, CMC enhances students’ motivation with respect to second language acquisition (Warschauer, 1996b), which is an important factor in language learning.

Few studies have dealt with the impact of CMC on L2 writing. These studies reported different findings on the impact of CMC on the writing of foreign language learners. Some of these studies (Chun, 1994; Gonzalez-Bueno, 1998; Stockwell & Harrington, 2003; Sullivan & Pratt, 1996; Warschauer, 1996a) found that CMC had a positive effect on students’ writing, i.e. writing improved in terms of quality. Other studies (e.g. Leh, 1999) reported that CMC had no impact on students’ writing. On the other extreme, some studies (Beauvois, 1992; Gonzalez-Bueno & Perez, 2000; Kelm,
1992; Kern, 1995) reported that CMC had a negative impact on students’ writing proficiency, i.e. it results in lower degrees of accuracy. These studies were conducted on different modes of CMC, on different languages and on students from different countries. These might be some of the reasons for the inconsistent findings. Accordingly, more research is needed on the different modes of CMC and on learners from different countries to provide a clear picture about the impact of CMC on students' writing.

The following section reports on the findings of some of the studies conducted on the role synchronous and asynchronous CMC can play in L2 writing. This is meant to highlight the potential of each mode of CMC and to provide a rationale for investigating asynchronous CMC with regards to grammatical accuracy in the present study.

### 2.4.1 Synchronous CMC and Second Language Writing

A number of studies (e.g. Beauvois, 1992; Chun, 1994; Kelm, 1992; Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996a) examined the potential of synchronous CMC with regards to writing. Some of these studies (e.g. Kern, 1995; Sullivan & Pratt, 1996; Warschauer, 1996a) focused on the potential of CMC in writing by comparing it to oral classroom discussions. Both Sullivan & Pratt (1996) and Warschauer (1996a) compared students in two ESL writing environments: a networked computer-assisted classroom and a traditional oral classroom. The findings of both studies support the positive impact of synchronous CMC on student writing, i.e. writing improves in quality (Sullivan & Pratt, 1996) and the language produced is lexically and syntactically more formal and complex in synchronous CMC (Warschauer, 1996a).
Kern (1995) compared the synchronous writing environment to the classroom environment, but the study was conducted in the foreign language setting, on students studying French. The findings of the study support the positive impact of synchronous CMC where the students’ productivity increased. He found that students had from two to three times more turns (opportunities) and produced two to four times more words and more sentences in the web discussion than in the oral discussion. The students also used a greater variety of discourse functions. However, Kern (1995) pointed out a negative impact of synchronous CMC exemplified in the fact that the students paid less attention to grammatical accuracy.

Other studies (e.g. Beauvois, 1992; Chun, 1994; Kelm, 1992) also examined the potential of synchronous CMC in improving writing, but without comparing it to oral classroom discussions. These studies provided descriptive information about the potential of the medium. Kelm (1992), for example, conducted his study in a second language teaching situation with non-native speakers of Portuguese, whereas Beauvois (1992) and Chun (1994) did their studies in foreign language setting with learners of French and German, respectively. All three studies reported that synchronous discussions increased language production and promoted student-to-student interaction. Chun (1994) also added that the quality of writing improved in terms of syntactic complexity and the number and variety of discourse functions used, which is similar to the findings of Sullivan & Pratt (1996) and Warschauer (1996a). Sotillo (2000) reported that the quantity and types of discourse functions found in synchronous discussions are similar to the types of interactional modifications found in face-to-face conversations.

A study by Blake (2000) investigated the impact of negotiation of meaning in a synchronous chat program on the development of L2 Spanish interlanguage. The
findings of the study suggested that synchronous CMC increases possibilities of negotiation of meaning. However, it is characterized by the predominance of lexical negotiations in contrast to the paucity of syntactic negotiations. Blake suggested that synchronous chat programs might not have an impact on developing the grammatical knowledge of the students. Sotillo (2000) supports this proposition where the findings of her study showed that in synchronous CMC, the students seemed to focus on meaning and disregard accuracy, especially grammatical accuracy compared to lexical accuracy. These results also confirm previous findings by Kern (1995), who reported loss of grammatical accuracy and lack of coherence because of the fast pace of the discussions taking place in real time.

In conclusion, a number of studies in the literature reported that real time CMC could have a positive impact on students’ overall writing skills. In real time CMC, students’ productivity increases (e.g. Beauvois, 1992; Kelm, 1992; Kern, 1995; Warschauer, 1996a), they produce language that is lexically and grammatically more complex (e.g. Chun, 1994; Warschauer, 1996a) and they produce a greater variety of discourse functions (e.g. Chun, 1994; Kern, 1995). However, the positive impact of synchronous CMC on students’ writing is only limited to the above-mentioned points. Synchronous CMC did not seem to have a positive impact on students’ overall writing skill. This is especially because a number of studies in the literature (e.g. Blake, 2000; Kern, 1995; Sotillo, 2000) have shown that synchronous CMC has a negative impact on the grammatical accuracy of the students. The fast pace of real-time CMC seems to facilitate fluency and ongoing discourse, but not syntactic accuracy (Sotillo, 2000). Based on these findings, synchronous CMC is not chosen as the target of investigation in the present study because its characteristics do not match well with the construct under investigation, namely grammatical accuracy.
2.4.2 Asynchronous CMC and Second Language Writing

A number of studies in the literature (Gonzalez-Bueno & Perez, 2000; Greenfield, 2003; Liaw, 1998; Van Handle & Corl, 1998) examined students’ perceptions of the impact of asynchronous CMC on their writing. Some of these studies were devoted mainly to examining students’ perceptions towards the medium (e.g. Greenfield, 2003); the other three studies (e.g. Gonzalez-Bueno & Perez, 2000; Liaw, 1998; Van Handle & Corl, 1998) examined students’ perceptions as a secondary issue. However, all these studies reported that the students had positive attitudes about the impact of asynchronous CMC on their writing skills and they reported that it helped them revise their writing better.

Apart from students’ perceptions, other studies in the literature examined the impact of asynchronous CMC on the writing of the students as represented by their written products in this medium. A study by Leh (1999) examined the use of asynchronous CMC in foreign language learning. The study investigated a number of questions. One question addressed whether the reading, writing and speaking performance of the students improved when using asynchronous CMC. The study compared the performance of two groups of students: students using email and those who did not use it. The quantitative analysis of the results indicated that there was no significant difference in writing, reading and speaking between the two groups. It is worth noting that this study examined writing as well as reading and speaking. Writing was not the focus of investigation in the study, and so the study examined the writing skill in general without specifying certain aspects of it.

Van Handle & Corl (1998) studied email exchanges between two German classes of intermediate level to determine improvements in students’ writing in German. The students in these two classes participated in asynchronous email
discussion in which they all read the same texts and reacted to them by sending written comments via email to both classes. The students’ instructors reported that the students’ email contributions showed better composition skills, e.g. increased use of new vocabulary, and use of structures.

Other studies investigated the impact of asynchronous CMC on specific aspects of the writing skill. Stockwell and Harrington (2003) and Gonzalez-Bueno and Perez (2000) looked into the impact of asynchronous CMC on the lexical and grammatical aspects of writing. Stockwell and Harrington (2003) examined output of L2 Japanese learners in a series of email exchanges with native speakers of Japanese for evidence of incidental development of L2 syntax and lexis. Quantitative and qualitative measures of the data indicated an increase in syntactic development. However, there was no evidence of quantitative development in vocabulary, but qualitative ratings did show a small improvement over the collection period.

Gonzalez-Bueno and Perez (2000) conducted an experiment to examine the effects of asynchronous dialogue journals on the language produced by learners of Spanish as a second language, compared with the paper-and-pencil version of dialogue journals. The objective of the study was to determine whether the use of email had any effect on the grammatical accuracy and appropriate use of vocabulary. In contrast to Stockwell and Harrington (2003), the quantitative analysis of the data showed that the electronic version of dialogue journals did not seem to pose any significant advantage over the paper-pencil version with regard to either lexical or grammatical accuracy. Gonzalez-Bueno and Perez attributed this to the nature of the dialogue journal technique, which promotes fluency and communicative aspects, but not necessarily accuracy.

Gonzalez-Bueno and Perez (2000) also examined another aspect of writing,
namely writing productivity. The results showed that the electronic version of dialogue journals had a significantly positive effect on the amount of language generated by the students. Language productivity was also studied by Wang (1993, cited in Dyson, 2001). Wang examined the writing of two groups of students who wrote dialogue journals to their instructor using email or paper-and-pencil. The students in the two groups were ESL university students in an intermediate reading and writing class. Similar to Gonzalez-Bueno and Perez (2000), Wang (1993) found that the students who used email for journal writing wrote more per session than those who used paper-and-pencil. The findings of both Gonzalez-Bueno & Perez (2000) and Wang (1993) were supported by Gonzalez-Bueno (1998), who identified increased language productivity as one of the features of the language produced in asynchronous CMC.

Gonzalez-Bueno (1998) conducted a study to examine the effectiveness of using email as a tool to promote foreign language learning. After examining the language produced by the students in the electronic dialogue journals, Gonzalez-Bueno managed to identify some of the features of the target language generated in the electronic medium. The study reported that, in asynchronous dialogue journals, the students produced greater amounts of language, used a wider variety of topics and language functions and reached higher levels of language accuracy. There were also more student-initiated interactions and the students used more personal and expressive language. Although the study supports the findings of Gonzalez-Bueno and Perez (2000) in terms of language productivity, it does not support its finding regarding lexical and grammatical accuracy, where there was evidence of improved accuracy in the asynchronous dialogue journals. However, it is in line with the findings of Stockwell and Harrington (2003) in terms of grammatical improvement. Flórez-
Estrada (1995, Cited in Stockwell & Harrington, 2003) also supports the role of asynchronous CMC in promoting grammatical skills. Flórez-Estrada (1995) reported that the use of email in an L2 writing class resulted in improved grammatical competence in the Spanish L2 of his students, as measured by the ACTFL proficiency guidelines.

A study by Sotillo (2000) attempted to compare the impact of synchronous and asynchronous CMC on writing in terms of discourse functions and syntactic complexity. The results showed that the discourse functions generated in asynchronous CMC were more formal than those found in synchronous discussions. As for syntactic complexity, the delayed nature of the asynchronous discussions provided the learners with more opportunities to produce syntactically complex language. In the asynchronous mode of CMC, the students produced written texts containing features that were more representative of formal written discourse, where the students paid more focal attention to language forms and grammatical accuracy.

To conclude, the findings of a number of studies in the literature seem to support the positive impact of asynchronous CMC on the writing of the students in terms of productivity (e.g. Gonzalez-Bueno & Perez, 2000) and accuracy (e.g. Flórez-Estrada, 1995; Gonzalez, 1998; Stockwell & Harrington, 2003). The reasons could be attributed to the fact that asynchronous CMC promotes learner autonomy and control in that the students can work at their own pace and outside the classroom (Sotillo, 2000). The use of asynchronous CMC influences both what ideas can be expressed and how ideas are expressed (Gonzalez-Bueno, 1998).

Although a number of studies in the literature showed that asynchronous CMC had a positive impact on the grammatical accuracy of the learners (e.g. Flórez-Estrada, 1995; Gonzalez, 1998; Stockwell & Harrington, 2003), other studies do not
seem to support this finding (e.g. Gonzalez-Bueno & Perez, 2000). This shows that the topic is controversial and highlights the need for more investigations of it, especially in terms of the different modes of asynchronous CMC.

### 2.5 Delayed Computer-Mediated Discussion (DCMD)

Delayed computer-mediated discussion (DCMD) is the form of asynchronous CMC that will be examined in the present study. DCMD is a written discussion that takes place via computer networks, but in delayed time. DCMD is also referred to as asynchronous or threaded discussions, i.e. sequenced by topic.

Task design is crucial in online exchanges. Discussion tasks are a feature of some pedagogical use of delayed CMC (Hanna & Nooy, 2003). Research on the potentials of L2 asynchronous interaction, especially discussions, has important implications for SLA (Stockwell & Harrington, 2003). Meaningful interaction in L2 requires learners to comprehend, produce and revise the target language (Stockwell & Harrington, 2003). Asynchronous discussion allows the learners more time to comprehend and then respond after editing their language. Thus, it promotes meaningful interaction. Asynchronous discussion also encourages the production of comprehensible input and provides purpose and personal involvement (Strambi & Bouvet, 2003). Moreover, discussions are more formal than other casual modes of delayed CMC, so they match well with a construct like accuracy, which has been identified as an important dependent variable in task-based SLA experimental studies (Foster & Skehan, 1996 cited in Sotillo, 2000). Computer-mediated discussion, e.g. DCMD has been identified as a promising area of research in second language learning (Ortega, 1997).
2.5.1 DCMD and Grammatical Accuracy in EFL Writing

The effect of DCMD on the improvement of basic formal aspects of the language, namely grammatical accuracy has not been the focus of previous experimental research (Gonzalez-Bueno & Perez, 2000). This is based on an assumption that computer-mediated discussion, including DCMD, fosters a focus on meaning and, hence, probably results in lower degrees of grammatical accuracy (Ortega, 1997). However, according to Greenia (1992), when writing is foregrounded as a communicative activity, the grammatical control teachers hope students will achieve is best acquired in this environment. When there is emphasis on the communication of ideas, the students are obliged to use a wider range of verb forms and grammatical structures (Kelm, 1992). Researchers have found that when writing for a wider audience with a communicative purpose, students as critics begin to focus more on content (e.g. coherence, organization, and clarity of ideas), in addition to form (e.g. grammatical accuracy, vocabulary and spelling) (Chun, 1994). Biesenbach-Lucas & Weasenforth (2000) and Murray (2000) also suggested that it is the specific context of use, i.e. audience, topic of discussion and the setting that really determines the levels of formality, e.g. grammatical accuracy in students' computer-mediated discussion. Accordingly, it cannot be generalized that computer-mediated discussion results in lower degrees of grammatical accuracy.

In order to define tasks that are pedagogically sound for L2 acquisition in the context of CMC, research should identify and analyze the specific features that define the particular CMC mode that will be used (Salaberry, 2000). The asynchronous nature of DCMD enriches the opportunity for writing beyond the time and space constraints of the traditional writing classroom. The students have more time to work at their own pace. Consequently, they can take time to process linguistic input and
produce more elaborate and complex language than electronic discussions taking place in synchronous CMC (Li, 2000). DCMD in particular, as opposed to real time discussion, provides the learners with more time to plan their writing and monitor the final written product by proofreading and editing their spelling, punctuation and grammar (Sotillo, 2000). The students pay more focal attention to language forms and grammatical accuracy (Sotillo, 2000). Thus, issues of grammatical accuracy might be a primary focus of research. DCMD increases students’ opportunities to focus on linguistic form, which is mainly manifested in the target language grammatical system (Sotillo, 2000).

In conclusion, the delayed nature of DCMD provides the students with more time to process input, so it places less demand on learners’ processing capacity. This allows them better opportunities to focus on linguistic forms (Stockwell & Harrington, 2003). Besides, DCMD allows students more time to better notice the input from others' messages, thus expanding their opportunities for monitoring their grammatical structures (Warschauer & Meskill, 2000). This is supported by the findings of a number of studies in the literature (e.g. Flórez-Estrada, 1995; Gonzalez-Bueno, 1998; Sotillo, 2000; Stockwell & Harrington, 2003). All these studies reported that asynchronous CMC has a positive impact on the grammatical accuracy of the students. In view of this, the present study attempts to investigate the impact of DCMD on the grammatical accuracy of EFL learners.
CHAPTER 3

Research Methodology and Design

3.1 The Proposed Design of the Study

To answer the research question that addresses the impact of DCMD on the grammatical accuracy of Egyptian learners’ EFL writing, i.e. exploratory cause and effect relationship, the study followed a quasi-experimental design. A sample of students volunteered to participate in the study. Then, these students were randomly assigned to an experimental and a control group.

3.2 Subjects

The participants in the present study were second year students at the Faculty of Nursing at Cairo University. The students’ age ranged between 18 and 25 years old. The total number of second year students at the Faculty of Nursing was 140. Their proficiency level was determined by a grammar test that included the grammar items in a TOEFL sample. The scores of the participants in the study ranged from 50% to 96%, indicating that they did not constitute a homogeneous group in terms of language proficiency.

Participation in the study was totally voluntary; those who were willing to participate were the subjects in the present study. The study targeted 30 subjects: 12 males and 18 females, who were randomly assigned to the experimental or control group, with 15 subjects in each group. The experimental group included seven males and eight females, whereas the control group included five males and 10 females.

The subjects were assured that their performance in the tasks of the study would not affect their grade in the English class, which, it was anticipated, would
lower their anxiety level.

### 3.3 Treatment

Since the study aimed to investigate the impact of DCMD on grammatical accuracy in writing, the experimental group communicated via the computer and the control group via PPD.

DCMD constituted the treatment in the present study. The experimental group was required to respond to topics in DCMD twice a week for three weeks. Experimental group members wrote on nine topics. The subjects in the control group were required to respond to the same topics, but in PPD. Topics relevant to the field of nursing were introduced in the discussions to motivate the subjects in both groups to participate. I was able to identify topics of high interest through class discussions with students in different academic levels at the Faculty of Nursing. Both groups were asked to respond to the following nine topics:

1. Would you take a job or volunteer to work with people who have AIDS? Why or why not? Explain.
2. What difficulties do you as a healthcare worker have when working with patients?
3. Do you think that nursing as a career is highly thought of in Egypt? Why or why not? Explain.
4. Mention some of the negative phenomena you have observed in Egyptian hospitals. How can we change them?
5. Who do you think is more professional: male or female nurses, why?
6. What is the worst disease(s) a person can get? Why?
7. What precautions do you take to avoid getting infected at work?

8. How would you deal with a patient who is mentally disturbed?
   Why?

9. Which is more serious: physical or mental illness? Why?

The contributions of the subjects were organized by topic number, and the topics were given to the subjects in the same order mentioned above.

### 3.4 Instrument of Measurement

#### 3.4.1 Pretest and Posttest

The main instruments used for evaluating the grammatical accuracy of the subjects’ writing were the pretest and posttest given to them. For both tests, subjects were asked to write essays. The treatment was administered during the three weeks between the pre- and posttests. Both were paper and pencil tests, i.e. written by hand. It was expected that if CMC had a positive impact on subjects’ writing, then it could transfer to subsequent handwritten essays (Nix, 1998 cited in Dyson, 2001). Giving the subjects paper and pencil tests also relates to the purpose of the study, which examines the impact of DCMD on the academic writing of students. The handwritten essays of the subjects were converted to computerized form, i.e. typed to ensure blindness of the raters, i.e. prevent bias that could result from bad handwriting, especially since the handwriting of most of the subjects was illegible.

Each test included one essay prompt on a topic related to the field of nursing. The tests were conducted as an out-of-class activity. The subjects in both the experimental and control groups were given one hour to write an essay of a minimum of 15 lines on a certain topic. The topics for the pretest and posttest were as follows:
**The pretest**

Why did you join the Faculty of Nursing? Would you recommend it to a friend? Why or why not? Explain.

**The posttest**

How can the nursing profession be improved in Egypt?

### 3.4.2 The Scoring Rubric

The instrument also included a scoring rubric, used to give brief definitions of the pertinent grammatical features. The definitions were adapted from Murphy (1987), a reference and practice grammar book for intermediate students. Providing definitions was meant to help raters focus on the target errors to ensure inter-rater reliability. Examples of the errors that are commonly made by the students were also provided in the rubric. They were taken from the errors actually made by the students in the pilot study conducted by the researcher (see Section 3.7). Errors were used in the study to refer to writing performance that is ungrammatical, i.e. not accounted for by the rules of English grammar (Crystal, 1985). Identical errors were counted only once, but errors of similar nature were counted whenever encountered. For example, if the student repeated "*A White House is in the USA*" a number of times in the essay, it was counted once. Other errors in using articles were counted as separate instances. A sample of the rubric designed by the researcher is given in Appendix A.

### 3.5 Procedures

The participants in the study were 30 students from one large class of second year students at the Faculty of Nursing. The subjects were randomly assigned to the
experimental or control group. I passed around a paper with numbers from 1 to 30 to
the subjects, so that each subject wrote his/her name next to one of the numbers. The
subjects whose names were written next to the odd numbers were assigned to the
experimental group and those whose names were written next to the even numbers
were assigned to the control group. This resulted in two groups; each including 15
subjects. However, it is worth noting that some of the subjects moved from the
experimental to the control group and vice versa in order to join the subgroup that
included their close friends.

The subjects in the experimental and control groups attended the same EFL
class. That is, they were taught by the same teacher, who is a demonstrator in the
Department of English Language and Literature at Cairo University. They studied the
same materials, did the same exercises, and took the same examinations. They also
received the same grammar instruction, not necessarily on the topics examined in the
present study. The only difference between the two groups was the use of DCMD in
the experimental group and PPD in the control group. The fact that the experimental
group participated in DCMD, while the control group did not might have resulted in
control group contamination effects such as the John Henry effect, treatment
diffusion, compensatory equalization of treatment or demoralization of the control
group, which might have influenced the internal validity of the study. In order to
overcome these effects, the researcher promised the control group that they would
engage in DCMD after three weeks, which was the duration of the study. This was
done by conducting a similar activity in which the control group members participated
in DCMD once a week for a period of three weeks. The internal validity of the study
also risked being threatened by the Hawthorne effect. To avoid this, the students were
told that they would participate in an activity that was intended to provide them with
more practice in writing.

The experimental and the control groups were required to respond to the same topics of discussion, and the discussion tasks were conducted as an out-of-class activity. I intended to use an advance organizer technique to brainstorm ideas with the subjects and provide them with the relevant vocabulary. However, their schedule, especially that of the experimental group who went to the computer lab once a week and two times to the internet café, was very busy and it was not possible to find a convenient time to conduct the advance organizer technique. However, the absence of the advance organizer technique did not seem to constitute a problem. As reported by the subjects’ English teacher, one of the objectives of their English class was to enrich their vocabulary by giving them synonyms of words in general English and some technical vocabulary. The subjects also seemed to have rich ideas because most of the topics for the discussion drew on their practical experience at hospitals.

For the purpose of participating in the discussion activities examined in the study, i.e. DCMD or PPD, the subjects in the experimental and control groups were further divided into sub-groups. Each sub-group included three students, so there were five sub-groups in the experimental group and five sub-groups in the control group. This was meant to facilitate the process of interaction between the subjects, because they might have found it difficult to read the whole 15 messages of their colleagues and respond to them. The researcher chose to have three students in each subgroup because the subjects in both groups responded to three topics a week, so there would not be enough time to read and respond to more than two of their colleagues.

The subjects were assigned to the discussion sub-groups according to their preferences to ensure interaction. The detailed procedures of the DCMD in the experimental group and the PPD in the control group are described below.
3.5.1 The Pretest

The two groups were both given a handwritten essay-writing test before the administration of the treatment. Then, three raters used the scoring rubric to identify the errors targeted in the present study and count them. After that, a graduate student in the Department of English Language and Literature at Cairo University identified and counted the total number of occurrences of each target feature. This was supposed to be part of the raters’ task but because of the relatively low grammatical proficiency of some of the participants in the study and the difficulty the raters had in identifying the errors, they could not continue the task.

3.5.2 The Raters

The raters were three EFL teachers, one graduate student in the Teaching of English as a Foreign Language (TEFL) department at AUC and two holders of TEFL Masters degrees from AUC. Since the grammatical features that were examined in the present study are basic structures, it was expected that the raters, as EFL teachers and TEFL students, master these structures. Their training was only limited to going over a sample test of the students’ tests and identifying the target problems using the scoring rubric. This ensured that the raters knew what to do and stayed on target. I explained to the raters that their task was to identify instances of each target structure and count the errors related to each feature and the total number of occurrences. However, as mentioned above, the raters only identified the errors and counted them and then another graduate student counted the total number of occurrences of each target structure. There were some disagreements among the raters, especially in terms of articles and prepositions, which were attributed to the relatively low grammatical proficiency of some of the subjects. In some instances, the raters had to restructure
whole sentences to make sense of them. They restructured sentences differently according to their writing styles. Sometimes differences in restructuring sentences resulted in disagreements. However the researcher held a meeting with the raters in which they reached agreement on disputed items.

3.5.3 The Experimental Group

The five discussion sub-groups in the experimental group were supposed to participate in DCMD on the same topics three times a week, for three weeks, through email exchanges. However, there were technical problems in the Internet connection at the Faculty of Nursing during the period of the experiment, and as a result the researcher had to take the subjects to an Internet café instead of using the Faculty lab. The subjects had minimal keyboarding and word-processing skills, which would have resulted in spending long hours at the Internet café. To avoid this, I took the subjects to the Faculty lab once a week to type their responses before going to the Internet café. Thus, the subjects ended up participating in DCMD two times a week instead of three. The typed responses were saved to a disk and retrieved at the Internet café by copying and pasting their contributions into the emails. It is worth noting that the experimental group members were not allowed to use the spell checkers in the word processor in order not to take an advantage over the control group.

Before starting the DCMD, the subjects attended one training session by the researcher on how to engage in DCMD. She also opened email accounts for them and set up email lists, which included their sub-group, all the members of the experimental group as well as herself.

The subjects engaged in DCMD two times a week, in which they responded to three topics. Once a week the subjects had to post their responses to two topics, and
not only one. The subjects were the ones to decide when to post one topic and when to post two. What mattered was that they would post three topics a week. The subjects were expected to read and respond to the discussions in their own sub-group. The subjects were required to write their names and the number of the topic for discussion in the subject line of each message for ease of reference.

The subjects sent copies of their contributions to all the members of the experimental group. This gave the subjects the option of reading contributions beyond those of their own sub-group and responding to them if they wanted. The aim was to increase the chances of interaction. However, they were told that their primary task was to discuss the topics with their own sub-group. Nevertheless, instead of abiding by the instructions, the subjects sent their contributions to all their colleagues and started reading the messages of their close friends, regardless of whether they belonged to their sub-group or not. Even though, the subjects read the contributions of some of their colleagues, they did not respond to any of them. In other words, the subjects did not really engage in online discussion, but rather in email communication, i.e. there was no interaction.

The researcher was on the email list to monitor the activity, where she gave the subjects the topics for the discussion and made sure that they were doing the activity, but without participating in the discussion. The subjects' email messages were systematically saved in the researcher's mail and were saved to a file for ease of retrieval. I also monitored the activity at the computer lab and the Internet café. At the Internet café, the experimental group members actually engaged in revision and editing of their contributions based upon peer feedback. Peer interaction in CMC could be a key element for students’ writing development (Hertz-Lazarowitz & Bar-Natan, 2002).
It was assumed that the experimental group would not engage in modes of CMC other than DCMD. This assumption was based on the fact that the subjects in the experimental group did not have previous experience with other modes of CMC. Informal talks with the subjects indicated either that they did not have computers at home or they did not have access to their PCs because they were living at the university hostel. Besides, the experimental group was given instruction on using DCMD only.

3.5.4 The Control Group

The subjects in the control group discussed the same topics assigned to the experimental group, but their discussions were via PPD. The five sub-groups discussed the same topics. Each sub-group used a notebook in which the three members of each sub-group shared their contributions to the discussion. The notebook circulated between the three members of each sub-group. It was handed to the researcher once a week, so that she could monitor the subjects' contributions and ensure their participation.

Similar to the experimental group, the subjects wrote to their peers in the sub-group, as well as to the researcher. The subjects were encouraged to read the notebooks of the other sub-groups if they wanted to by exchanging notebooks. It was possible for them to have access to the contributions of all the other sub-groups just like the subjects in the experimental group had access to the contributions of the other sub-groups. This was meant to increase the chances of interaction, and also to make the experimental and the control groups as similar as possible. However, the control group members did not engage in any interaction, i.e. discussion. The subjects wrote their contributions and read those of their sub-group members, but did not respond to
each other’s contributions. Unlike the case with the experimental group, I did not monitor the subjects’ composition process. In other words, there is no way to tell whether or not they engaged in revising and editing their contributions based upon peer feedback.

The control group shared the same conditions of the experimental group, so it was also assumed that the control group did not engage in DCMD during the experiment. This assumption was based on their limited knowledge of using the Internet and their lack of access to PCs either because they do not have one or because they were living at the university hostel.

3.5.5 The Posttest

Five days after administration of the treatment, the subjects in both the experimental and the control groups were given a posttest— a handwritten essay writing test. Then, the three raters used the scoring rubric to identify the errors in using the grammatical structures targeted in the study and to count them. Similar to the pretest, the graduate student identified and counted the total number of occurrences of each target structure.

Finally, the relevant statistical procedures (Section 3.6.2) were applied to analyze and interpret the findings.

3.6 Data Analysis and Interpretation

3.6.1 Data Needed to Answer the Research Question

The subjects’ essays in the pretest and posttest were the main source of data. Grammatical accuracy was measured in terms of the grammatical features that were targeted in the present study. Each grammatical feature was quantified separately.
Each was quantified by dividing a given target error by the total number of occurrences of that grammatical feature.

3.6.2 Procedures Used to Analyze the Data

The data for each of the experimental and control groups were tabulated. Each target grammatical feature was illustrated in a separate table, which included the number of errors and the total number of occurrences of that grammatical feature as presented in the output of each subject. Then, procedures in a statistical package (SPSS for PC) were used to analyze the data in the following steps:

1. The number of each error type was divided by the total number of its occurrence, and proportions were obtained.
2. Descriptive statistics were conducted to obtain the mean and standard deviation of each target grammatical feature in the pretest and posttest of the experimental and control groups.
3. Frequency analyses were conducted on the proportions of errors after converting them to percentages.
4. A paired $t$-test (with dependent samples) was used to compare the pre- and post-test performance of each group.
5. The Levene Test for equality of variance was conducted on the pretest of the experimental and control groups to make sure it was appropriate to use $t$-test on the posttest of the two groups.
6. Another $t$-test (with independent samples) was used to compare the posttest performance of the experimental group with that of the control group.

3.7 The Pilot Study

A pilot study was conducted by the researcher in April 2003. The participants
in the pilot study were one class of students in the English Language Institute (ELI) at AUC, namely, English 98. There were 12 students in this class, seven males and five females, ranging in age from 17 to 19 years old.

The study investigated the impact of email communication on the lexical and grammatical accuracy of Egyptian EFL students’ writing. The students were required to participate in email discussion daily for a period of one week. Prompts for the email discussion included the following topics:

1. What are the most important things you learned from your experience of giving an oral presentation?

2. Find one professor to recommend as a live lecturer and explain why?

3. Explain to your classmates what you do in Sham El Naseem.

4. Tell your classmates about a web site you have critiqued and what you found.

5. What are the three most important things you would do to prepare a conference in your city? Why?

6. Tell your foreign friends about Sinai Liberation Day.

7. Which is better: mixed or segregated schools? Why?

The students were given a writing pretest and a posttest and the treatment, i.e. email discussion, was administered in the intervening seven days. These two writing tests included essay items. Each test included one essay item only, where the students were given a general topic as a prompt to write on. The topics for the essays in the tests were taken from the ones the class teacher used for the assignments in class. The students were asked to write essays on the following topics:
1. **Pretest**: Journalists play an important role in our lives, what are the things a reader should expect from a journalist and what are the things a reader expects a journalist will not do?

2. **Posttest**: Some people claim that any form of education other than co-education is unthinkable. What are the advantages and disadvantages of having males and females in the same classroom?

   The essays representing the pretest and the posttest were corrected by the teacher for all the errors. Using a scoring rubric, the researcher and another rater classified and counted the lexical and grammatical errors.

   The results showed that there was no difference between the pretest and the posttest in terms of the students’ lexical and grammatical accuracy. Accordingly, the treatment, which was email communication, had no impact on the students’ writing in terms of lexical as well as grammatical accuracy. It was concluded that for this particular group of students, email communication for a period of one week had no impact on the students’ writing accuracy, be it lexical or grammatical. Conducting the pilot study helped the researcher to focus on only one aspect of accuracy, namely grammatical accuracy, and also to limit the definition of grammatical accuracy to certain grammatical topics that were most problematical for the students.
CHAPTER 4

Results

4.1 Introduction

This chapter presents the results of the pretest and posttest that were administered to both the experimental and control groups in order to answer the research question investigated in the study. Descriptive statistics are firstly introduced, and they are followed by inferential statistics.

4.2 Descriptive Statistics: Frequency Analyses

Frequency analyses were conducted on the percentages of the proportions of errors (number of errors/total number of their occurrences). The aim was to show general tendencies in the performance of the experimental and control groups on the pretest and posttest in each target grammatical feature. The frequency analysis for each grammatical feature is presented in a separate table, which includes the pre- and posttest performance of the subjects, and for each of the experimental and control groups separately.
### 4.2.1 Subject/Verb Agreement

| Experimental Group: Subject/Verb Agreement |

<table>
<thead>
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<th>Pretest</th>
<th></th>
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<th>Posttest</th>
<th></th>
<th></th>
</tr>
</thead>
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<td>Percentage of Subjects</td>
<td>Percentage of Errors</td>
<td>Frequency of Subjects</td>
<td>Percentage of Subjects</td>
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</table>

Minimum =0
Maximum =43
Mean =0.16
SD=0.12
Minimum=0
Maximum=58
Mean=0.22
SD=0.20
As shown in Table 1, on the pretest 13.3% of the subjects, i.e. two subjects, did not make any errors in using subject/verb agreement, compared with 26.7% of the subjects, i.e. four subjects, on the posttest. This showed that the number of subjects who did not make errors in using subject/verb agreement increased on the posttest. However, the maximum percentage of errors tended to increase on the posttest. The highest percentage of errors on the pretest was 43% and only one subject got this percentage, whereas on the posttest 20% of the subjects, i.e. three subjects, made 50% errors and above. Surprisingly, this means that errors in subject/verb agreement tended to increase on the posttest. This was also supported by the means of errors. As illustrated in Table 1, the posttest mean was higher than the pretest mean. The subjects in the experimental group tended to make more errors in using subject/verb agreement on the posttest, i.e. after exposure to the treatment.
Table 2
Control Group: Subject/Verb Agreement

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<tr>
<th>Control Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
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<td>Percentage of Errors</td>
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<tr>
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</tr>
</tbody>
</table>

Minimum=0
Maximum=39
Mean=0.20
SD=0.14

Minimum=0
Maximum=100
Mean=0.33
SD=0.34
On the pretest, 26.7% of the subjects, i.e. four subjects, did not make any errors in using subject/verb agreement. Similarly, on the posttest, 26.7% of the subjects did not make any errors in subject/verb agreement. Unexpectedly, 13.3% of the subjects in the control group did not get a single instance of subject/verb agreement right. The heterogeneous nature of the group was shown in the minimum and maximum percentages of errors. Whereas, 13.3% of the subjects did not have any correct instances of using subject/verb agreement, 26.7% of the subjects did not make any errors in using subject/verb agreement.

The percentages of errors ranged from 0% to 39% on the pretest; on the posttest the percentages ranged from 0% to 100%. It was clear that the percentages of errors tended to increase on the posttest. The maximum percentage on the pretest was 39%, whereas in the posttest there were higher percentages, e.g. 40%-75% and even 100%. On the posttest, 26.7% of the subjects, i.e. four subjects, had percentages above 39%. The mean scores of errors also highlighted this increase of errors on the posttest. The control group members tended to make more errors in using subject/verb agreement after participating in PPD for three weeks.
### 4.2.2 Articles

#### Table 3

**Experimental Group: Articles**

<table>
<thead>
<tr>
<th>Percentage of Errors</th>
<th>Frequency of Subjects</th>
<th>Percentage of Subjects</th>
<th>Percentage of Errors</th>
<th>Frequency of Subjects</th>
<th>Percentage of Subjects</th>
</tr>
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<td>11</td>
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</tbody>
</table>
Table 3 shows that the lowest percentage of errors on the pretest was 11% and the highest was 63%. On the posttest, the percentages of errors ranged from 12% to 60%. There was a decrease in the maximum percentage, where errors decreased from 63% to 60%. This was accompanied by a slight decrease in the posttest mean (0.34 vs. 0.35). However, it is worth noting that this decrease was based on one subject’s performance, so it could not be taken into consideration.
### Table 4

**Control Group: Articles**

<table>
<thead>
<tr>
<th>Control Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percentage of Errors</strong></td>
<td><strong>Frequency of Subjects</strong></td>
<td><strong>Percentage of Errors</strong></td>
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<td>6.7</td>
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<td>6.7</td>
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<td>60</td>
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<td>6.7</td>
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<tr>
<td>92</td>
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</table>

Minimum=24  
Maximum=92  
Mean=0.51  
SD=0.21  

Minimum=0  
Maximum=89  
Mean=0.44  
SD=0.37
On the pretest, the minimum percentage of errors was 24% and the maximum percentage was 92%. On the posttest, one subject, 6.7% of the control group, did not make any errors in using articles. In spite of the obvious high percentages of errors on the pre- and posttests, the percentages of errors tended to decrease on the posttest, where the maximum percentage on the posttest was 89%, as opposed to 92% on the pretest. As illustrated in Table 4, the posttest mean of errors was also lower than the pretest mean. The number of errors made by the subjects decreased on the posttest, but this decrease was also based on individual subjects’ performance.
### 4.2.3 Prepositions

#### Table 5

**Experimental Group: Prepositions**

<table>
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<tr>
<th>Experimental Group</th>
<th>Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
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<td>Percentage of Errors</td>
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<td>Percentage of Subjects</td>
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<tr>
<td>38</td>
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</tr>
</tbody>
</table>

Minimum=0   Maximum=38   Mean=0.16   SD=0.12

Minimum=4   Maximum=25   Mean=0.12   SD=6.8
Table 5 shows that on the pretest, 20% of the subjects, i.e. three subjects, made no errors in using prepositions, while on the posttest there was no single instance of not making errors. The highest percentage of errors on the pretest was 38%, compared with 25% on the posttest. As shown in Table 5, 20% of the subjects scored above 25% on the pretest, indicating that the percentages of errors decreased on the posttest. The experimental group tended to make fewer errors in prepositions after the three weeks of the experiment.
<table>
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<tr>
<th>Pretest</th>
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<td>Percentage of Errors</td>
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</table>

Minimum=2  Minimum=3  
Maximum=81  Maximum=35  
Mean=0.23  Mean=0.15  
SD=0.20  SD=9.18
The percentages of errors for the control group on the pretest had a minimum of 2% and a maximum of 81%. On the posttest, the percentages of errors tended to decrease, where the maximum percentage became 35%, compared with 81% on the pretest. On the pretest, 13.3% of the subjects, two subjects, had percentages above 35%. The mean scores of errors also pointed to a decrease on the posttest (0.15 vs. 0.23). The control group tended to make fewer errors on the posttest.
### 4.2.4 Tenses

Table 7

**Experimental Group: Tenses**

<table>
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<th>Experimental Group</th>
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</table>

Minimum=0  
Maximum=50  
Mean=0.23  
SD=0.14  

Minimum=0  
Maximum=43  
Mean=0.19  
SD=0.13
On the pretest, the subjects’ percentages of errors ranged from 0% to 50%. Two subjects, 13.3%, had 50% errors in using tenses. This means that 50% of their use of tenses was incorrect. One subject, 6.7%, did not make any errors in using tenses on the pretest. Similar to the pretest, one of the subjects, 6.7%, did not have any errors in using tenses on the posttest. The minimum percentage was 0%, whereas the maximum percentage was 43%. On the pretest, 13.3% of the subjects, two subjects, had percentages of errors above 43%. This indicated a decrease in the percentages of errors on the posttest. The subjects’ errors in using tenses tended to decrease after participating in DCMD for three weeks.
Table 8

Control Group: Tenses

<table>
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<th>Pretest</th>
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</thead>
<tbody>
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<td>Frequency of Subjects</td>
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<td>2</td>
</tr>
<tr>
<td>50</td>
<td>1</td>
</tr>
<tr>
<td>58</td>
<td>1</td>
</tr>
<tr>
<td>75</td>
<td>1</td>
</tr>
<tr>
<td>70</td>
<td>1</td>
</tr>
<tr>
<td>73</td>
<td>1</td>
</tr>
</tbody>
</table>
On the pretest, 13.3% of the subjects, i.e. two subjects, did not make any errors in using tenses. There was no such instance on the posttest. On the posttest, the lowest percentage of errors was 5% and the highest percentage was 73%. This could have indicated that errors decreased on the posttest. However, a close inspection of the percentages on the pre- and posttests indicated that 86.7% of the subjects had percentages of errors below 58% on the pretest, whereas 66.5% of the subjects scored below 58% on the posttest. In fact, this pointed to an increase in percentages of errors on the posttest. The means of errors, as illustrated in Table 8, also revealed an increase in errors. The subjects in the control group showed a tendency to make more errors after the experiment.

4.3 Inferential Statistics

In this section, the results of the pre- and posttests are presented along with the inferential statistical tests that were run to measure whether there were any significant differences between the results of the pre- and posttests for the experimental and control groups. Their results were examined for each of the target grammatical features. The $t$-test was used to detect differences in performance within each group, i.e. in-group differences and also to detect differences between the experimental and control groups.
4.3.1 The Impact of DCMD on Grammatical Accuracy: In Group Differences

A paired \( t \)-test (with dependent samples) was used to detect in-group differences, i.e. differences within each of the experimental and control groups, after the three weeks of the experiment. The test was conducted on each grammatical feature separately.

4.3.1.1 Subject/verb agreement

For the first grammatical feature, namely subject/verb agreement, a paired \( t \)-test (with dependent samples) was conducted on the pre- and posttests results of the experimental and control groups. The purpose of using the paired \( t \)-test was to detect the impact of DCMD on subject/verb agreement. The results are shown in Table 9.
Table 9
Dependent t-test for Subject/Verb agreement

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15</td>
<td>0.16 SD= 0.12</td>
<td>0.22 SD= 0.20</td>
<td>-6 t= -1.188 df= 14 p= 0.254</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.20 SD=0.14</td>
<td>0.33 SD= 0.34</td>
<td>-0.1305 t= -1.731 df= 14 p= 0.105</td>
</tr>
</tbody>
</table>

The mean of errors for the experimental group on the posttest was higher than the mean of errors on the pretest. This could have indicated that the errors made by the experimental group members increased on the posttest, but the $p$ value, as illustrated in Table 9, showed that the difference was not significant. Similarly, the control group had a higher mean on the posttest, which was also rendered insignificant. Thus, there were no significant differences between the performance of the experimental and control groups on the pretest and posttest in terms of subject/verb agreement. The subjects in both groups did not make fewer errors in using subject/verb agreement after the experiment.
4.3.1.2 Articles

Table 10
Dependent t-test for Articles

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15</td>
<td>0.35</td>
<td>0.34</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD= 0.16</td>
<td>SD= 0.16</td>
<td>t= -1.188</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df= 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p= 0.836</td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.51</td>
<td>0.44</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD=0.21</td>
<td>SD= 0.27</td>
<td>t= 1.341</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>df= 14</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>p= 0.201</td>
</tr>
</tbody>
</table>

In terms of articles, the mean of errors for the experimental group was nearly equal in both the pretest and posttest, but this slight difference was not significant. That is to say, there were no significant differences between the errors made by the subjects on the pretest and posttest. As for the control group, even though the mean of the posttest was lower than in the pretest, but the $p$ value denoted that the difference was not significant. In other words, the difference between the errors the subjects made in the pretest and posttest was not significant.
4.3.1.3 Prepositions

Table 11
Dependent t-test for Prepositions

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15</td>
<td>0.16</td>
<td>0.12</td>
<td>4.2</td>
</tr>
<tr>
<td></td>
<td>SD=0.12</td>
<td>SD=6.8</td>
<td>t=1.385</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>df=14</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>p=0.188</td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.2265</td>
<td>0.1513</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>SD=0.20</td>
<td>SD=9.2</td>
<td>t=1.279</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>df=14</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>p=0.222</td>
<td></td>
</tr>
</tbody>
</table>

In prepositions, the experimental group had a lower mean on the posttest, where the subjects’ errors tended to decrease on the posttest. However, as indicated by the $p$ value, the difference was not significant. The control group also had a lower mean on the posttest that proved to be insignificant. For both groups, there were no significant differences between the pretest and posttest in using prepositions.
### 4.3.1.4 Tenses

#### Table 12

**Dependent t-test for Tenses**

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Pretest Mean</th>
<th>Posttest Mean</th>
<th>Mean Difference</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15</td>
<td>0.23</td>
<td>0.19</td>
<td>3.4</td>
<td>0.735</td>
<td>14</td>
<td>0.475</td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td>SD=0.14</td>
<td>SD= 0.13</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.39</td>
<td>0.40</td>
<td>-0.1305</td>
<td>-1.596</td>
<td>14</td>
<td>0.133</td>
</tr>
<tr>
<td></td>
<td></td>
<td>SD=0.21</td>
<td>SD=0.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As for tenses, the mean of errors for the experimental group on the posttest was lower than in the pretest. As the *p* value was 0.475, the difference was not significant. In contrast to the experimental group, the control group had a higher mean on the posttest, i.e. the subjects’ errors were inclined to increase on the posttest, but as manifested by the *p* value, this difference was also insignificant.

In summary, the comparison of the pretest means and posttest means for the experimental group in terms of subject/verb agreement, articles, prepositions and
tenses showed that there were no significant differences between the pretest and posttest performance of the subjects after the three weeks of the experiment. The subjects did not make fewer errors in using the target grammatical features after participating in DCMD for three weeks. Similarly, there were also no significant differences between the pretest and posttest means of the control group. The control group members did not use the pertinent features more correctly after participating in PPD for three weeks.

4.3.2 The Impact of DCMD on Grammatical Accuracy: Differences between Groups

After examining the impact of DCMD on the experimental group and that of PPD on the control group, i.e. in-group differences, an independent $t$-test was applied to compare the posttest performance of the experimental and control groups in terms of subject/verb agreement, articles, prepositions and tenses.

Before conducting the independent $t$-test on the posttest of the experimental and control groups, the Levene Test for equality of variances was conducted on the pretest of the experimental and control groups. The purpose was to make sure that there was no significant variance between the two groups in using the target grammatical features before the experiment was conducted. Hence, if there were any significant differences in their performance on the posttest, they could be attributed to the treatment. In other words, the Levene Test was used to ensure that it would be appropriate to use the independent $t$-test in comparing the posttest performance of the two groups. The results of the Levene Test are given in Table 13.
As indicated by the $F$ values and the significance values, there was no significant variance between the means for the experimental and control groups on the pretest in each of the grammatical features targeted in the study. That is to say, there were no significant differences between the two groups in using the target features before the experiment began. Hence, the use of the $t$-test to compare the posttest performance of the experimental and control groups proved to be appropriate.

The performance of the subjects in terms of subject/verb agreement, articles, prepositions and tenses on the posttest was compared in the experimental and control groups. Another $t$-test (independent sample test) was conducted on the posttest of the experimental and control groups. The results are presented in the following tables.
4.3.2.1 Subject/Verb Agreement

Table 14 illustrates the results for subject/verb agreement:

Table 14

Independent t-test for Subject/ Verb Agreement

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Posttest Mean</th>
<th>SD</th>
<th>Mean Difference</th>
<th>T value</th>
<th>SIG P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>15</td>
<td>0.22</td>
<td>0.20</td>
<td>-0.1106</td>
<td>-1.091</td>
<td>0.285</td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.33</td>
<td>0.34</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As shown in Table 14, the posttest mean for the control group was higher than that for the experimental group, i.e. the control group made more errors in subject/verb agreement after the experiment was conducted. At a $p$ value of 0.285, this difference was rendered insignificant. Accordingly, there were no significant differences between the posttest mean for the experimental group and that for the control group. That is to say, there were no significant differences between the errors made by both groups in using subject/verb agreement after the three weeks of participating in DCMD and PPD, respectively.
4.3.2.2 Articles

The results for articles are presented in Table 15:

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Posttest Mean</th>
<th>SD</th>
<th>Mean Difference</th>
<th>T value</th>
<th>SIG P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15</td>
<td>0.34</td>
<td>0.16</td>
<td>-1</td>
<td>-1.2</td>
<td>0.24</td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.44</td>
<td>0.37</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 15 demonstrates that the *t*-test did not show a statistically significant difference between the posttest means of the experimental and control groups in articles. Although the posttest mean for the control group was higher than in the experimental group, this difference was not significant as indicated by the *p* value. The errors made by the subjects in both groups were not significantly different.
4.3.2.3 Prepositions

Table 16 displays the results for prepositions:

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Posttest Mean</th>
<th>SD</th>
<th>Mean Difference</th>
<th>T value</th>
<th>SIG P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>15</td>
<td>0.12</td>
<td>6.8</td>
<td>-3</td>
<td>-1.167</td>
<td>0.253</td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.15</td>
<td>9.2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The paired-sample t-test measures for prepositions did not yield statistically significant differences between the posttest means for the experimental and control groups. The p value revealed that the slightly higher mean for the control group was not significant. The two groups did not show significant differences in the error they made after the experiment.
4.3.2.4 Tenses

The results for tenses are shown in Table 17:

<table>
<thead>
<tr>
<th>Group</th>
<th>Number of Subjects</th>
<th>Posttest Mean</th>
<th>SD</th>
<th>Mean Difference</th>
<th>T value</th>
<th>SIG P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Group</td>
<td>15</td>
<td>0.19</td>
<td>0.13</td>
<td>-0.1998</td>
<td>-2.736</td>
<td>0.011</td>
</tr>
<tr>
<td>Control Group</td>
<td>15</td>
<td>0.39</td>
<td>0.25</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Statistically significant difference at $p = 0.01$ was obtained for tenses, where the posttest mean for the control group was higher than in the experimental group. This means that after the experiment, the errors made by the control group in using tenses were significantly higher than those of the experimental group.

In summary, the results of the $t$-test (with independent samples) showed that there were no significant differences between the posttest means for the experimental and control groups in terms of subject/verb agreement, articles and prepositions. Nevertheless, the mean scores of errors for the experimental group were generally lower than those for the control group. In other words, although the differences between the groups were not statistically significant, the experimental group showed a
slight tendency to make fewer errors.

However, the \( t \)-test for tenses pointed to a significant difference between the posttest means for the experimental and control groups, where the posttest mean of errors for the control group was higher than in experimental group. The control group made more errors in tenses on the posttest than the experimental group. This could be considered an evidence of progress on part of the experimental group.

4.4 Conclusion

This chapter presented the results of the pretest and posttest of the experimental and control groups. The aim was to find if DCMD had an impact on the grammatical accuracy of the experimental group exemplified in subject/verb agreement, prepositions and tenses, and to compare its performance with that of the control group, which used PPD. In the next chapter, interpretations of these results are presented.
CHAPTER 5

Discussion

5.1 Introduction

This chapter analyzes and interprets the results of the descriptive and inferential statistical analyses presented in Chapter 4. The results of the pre- and posttests are discussed in relation to the research question investigated in the study.

5.2 The Impact of DCMD on Grammatical Accuracy of Egyptian EFL Learners’ Writing

The results of the pretest and posttest for the experimental and control groups were analyzed using the paired t-test to detect differences within both the experimental and control groups. There were no significant differences between the pre- and posttest means for the experimental group after the three weeks of exposure to DCMD. Accordingly, it can be concluded that the use of DCMD did not have an impact on grammatical accuracy of Egyptian EFL learners’ writing in terms of subject/verb agreement, articles, prepositions and tenses, as the experimental group did not improve in these grammatical features as a result of exposure to DCMD. Similarly, the t-test measures for the control group did not yield statistically significant results. No significant differences were detected between the pretest and posttest means for the control group. The subjects’ participation in PPD did not have an impact on their grammatical accuracy.
When the posttests for the experimental and control groups were compared using the independent \( t \)-test, the results showed that there were also no significant differences between the posttest means for the two groups in subject/verb agreement, articles and prepositions. This means that DCMD, in contrast to PPD, did not have any impact on the grammatical accuracy of the students exemplified in subject/verb agreement, articles and prepositions. The experimental group did not perform better than the control in using these grammatical features, after three weeks of participating in DCMD. However, when comparing the posttest means for the two groups in the grammatical feature of tenses, there was a significant difference. The posttest mean for the control group was higher than in the experimental group. That is to say, the control group made more errors in using tenses on the posttest, as compared with the experimental group. This implies that DCMD demonstrated a better impact on students’ use of tenses, as compared with PPD.

It is worth noting that even though the differences between the two groups were not statistically significant, the experimental group showed a slight tendency to make fewer errors. A close inspection of the results of the frequency analyses demonstrated some similar tendencies that are worth pointing out. For example, the subjects in the experimental group tended to make fewer errors in using articles, prepositions and tenses on the posttest. The control group also showed a tendency to make fewer errors in articles and prepositions. This suggests that learners could benefit from the combined effect of DCMD and PPD. More research is needed to investigate the potential of DCMD on grammatical accuracy.

5.3 Other Factors

The lack of significance in the results of the present study could be attributed
to a number of variables not addressed in the study. One of these might have to do with the subjects’ motivation. Even though participation in the study was voluntary and the students willingly volunteered to participate in the study, they showed considerable lack of motivation when they were required to start writing on the topics for the discussions. They often complained that they did not have the time to write on three topics a week, and they often delayed work. This lack of motivation reached its peak on the posttest. The subjects were totally unwilling to take the posttest and most of them wrote the essays in a very careless way. Though the subjects were given an hour to write the essay for the posttest, most of them spent less than 30 minutes on the task. They did not edit or revise their essays at all. The raters reported that some of the errors were not actually errors but rather mistakes because the subjects wrote them in a correct way somewhere in their essays. Lack of motivation on the posttest might also be associated with fatigue because the posttest was conducted after the students did practical training in the hospital. I was not able to conduct the posttest at a more suitable time because of the busy schedule of the students.

The students’ schedule was very busy. It started at 8 o’clock everyday and it included getting practical training at hospitals, attending lectures and giving presentations. These conditions might be the cause of their lack of motivation. They volunteered to participate in the study early in the semester before getting involved in their academic work. When they started to get busy, they lost interest and considered the activity a burden that they wanted to get rid of. Besides, it happened that the posttest coincided with the practical exams of the students. This might be another cause for their lack of motivation to take the posttest.

Lack of significance could also be attributed to the short period of administration of the treatment. The experimental group participated in DCMD, two
times a week for a period of three weeks, which amounted to 10-12 hours. This short period of exposure to the treatment was not enough for improvement to occur, especially in the light of the very low proficiency of some of the participants. Besides, technical problems and the low keyboarding and word-processing skills of the subjects prevented them from benefiting from the advantages of DCMD. Some of the subjects spent most of the time attempting to solve technical problems, typing or enquiring about how to use the word processor. In short, the students did not make the best use of DCMD.

It is also worth noting that the experimental group often went to the Internet café after finishing their classes, at which time they were naturally fatigued. I noticed that some of them spent the time sending greeting cards to their colleagues or playing games. Those who responded to their colleagues’ messages sent emails of greeting or funny comments. Some others who attempted to send serious comments faced technical problems in the server while sending them, and they did not bother to write them again. A number of subjects spent most of the time typing or changing font size, color, face, and they sent their contributions towards the end of the experiment.

In addition, subjects who typed their contributions in the computer lab at the Faculty of Nursing before going to the Internet café faced serious problems saving their work to disks and trying to retrieve it at the Internet café. Sometimes, the disks did not work and they had to type their work all over again. Technical problems demotivated the students considerably. Another factor that might have come into play is the topic effect. It has been reported by the raters that the topic for the posttest required using a wider variety of grammatical features than that for the pretest.

Finally, it is worth noting that statistically speaking, the small number of the participants in the study, 30 students, could be one of the reasons for not getting a
The present study aimed to investigate the impact of DCMD on the grammatical accuracy of EFL learners, exemplified in subject/verb agreement, articles, prepositions and tenses. The results of the study showed that DCMD did not have a significant impact on the performance of the experimental group in using the target grammatical features. There were no significant differences between the errors made by the subjects on the pretest and posttest. Thus, in the present study, DCMD did not have an impact on the grammatical accuracy of Egyptian EFL learners’ writing.

When the results of the experimental group and control groups were compared, i.e. DCMD verses PPD, the results also indicated that there were no significant differences between the experimental and the control groups after the experiment in terms of using subject/verb agreement, articles and prepositions. However, significant differences were obtained in terms of tenses. As opposed to PPD, DCMD had a positive impact on improving the subjects’ use of tenses, i.e. they made fewer errors than the PPD group on the posttest. It can be concluded that, as opposed to PPD, DCMD had a positive impact on Egyptian EFL learners’ use of tenses.

A close inspection of the data through frequency analyses highlighted some tendencies in the subjects’ performance. Though there were no significant differences, the students who participated in DCMD showed a tendency to make fewer errors in using articles, prepositions and tenses in the posttest. The subjects who participated in PPD tended to make fewer errors in using articles and prepositions, indicating that
learners could benefit from the combined effect of DCMD and PPD. More research is needed to confirm these propositions, yet they highlight some positive potentials of DCMD and PPD that could be further examined in future research.

5.5 Comparing the Results with Other Studies in the Literature

Few studies in the literature examined the impact of asynchronous CMC on the grammatical accuracy of language learners. These studies were not mainly devoted to examining its impact on grammatical accuracy. In other words, grammatical accuracy was investigated together with other dependent variables such as lexical accuracy and language productivity. Besides, these studies examined different forms of asynchronous CMC, not necessarily DCMD. In view of this, the findings of these studies were compared with the present study on the basis that they all examined the potential of asynchronous CMC, in general, on grammatical accuracy.

The present study supports the findings of Gonzalez-Bueno & Perez (2000). Similar to the findings of the present study, Gonzalez-Bueno & Perez indicated that the use of asynchronous dialogue journals, which are somewhat comparable with discussion, did not result in any significant advantage over the handwritten dialogue journals in improving subjects’ grammatical accuracy. Gonzalez-Bueno & Perez (2000) attributed this lack of significance to a number of reasons; one of which was the need for more controlled and form-focused activities. DCMD, as an activity, is more controlled than journal writing because the subjects were given specific topics to respond to. However, the activity was conducted as an out-of-class activity, and it was not graded, so the students did not take it seriously, i.e. it was still not well enough controlled. DCMD also did not seem to focus the subjects’ attention on form. The
subjects were writing to their colleagues and to the researcher. The informal nature of the interaction did not seem to focus their attention on form. They were keener on expressing their ideas. Thus, the present study shares with Gonzalez-Bueno & Perez (2000) some of the reasons for not getting significant results.

The findings of the present study do not lend support to a number of other studies in the literature. Gonzalez-Bueno (1998) examined some of the features of the foreign language generated through email communication. The findings of the study indicated that asynchronous email communication resulted in higher grammatical accuracy. Gonzalez-Bueno had 50 subjects and their participation was followed longitudinally over two semesters. The larger sample size and the longer duration of the study might be some of the reasons for getting significant results. However, it is worth noting that Gonzalez-Bueno (1998) reported that he observed that there was a reduction in grammatical accuracy towards the end of the study. He attributed this to the fact that the students ventured to use more complicated structures towards the end of the study and it was accompanied by decreased self-monitoring. This observation might to be applicable to the students’ performance in the posttest in the present study. As reported by the raters, the topic of the posttest was more difficult than that of the pretest. The subjects might have been pushed to experiment more with the language, or in other words to use more complicated structures. This might have been accompanied by no revision or editing, i.e. self-monitoring, which might have resulted in a reduction in grammatical accuracy.

The results of the present study also do not confirm the findings of Stockwell & Harrington (2003), who reported that the use of email resulted in increase in syntactic development. The subjects in the study by Stockwell & Harrington maintained at least four to five email exchanges with their partners per week over a
five-week period. Their exposure to email communication was more intensive than the subjects in the present study and the duration of the study was also longer. These might be some of the reasons why the study by Stockwell & Harrington (2003) reported an increase in syntactic development, as opposed to the present study.

The findings of Sotillo (2000) demonstrated that the subjects who used asynchronous discussion, as opposed to synchronous discussion, tended to produce syntactically more complex language. However, she observed that the subjects’ postings in asynchronous discussion contained grammatical inaccuracies, as in the posttest in the present study. She attributed this to the fact that when the subjects experiment with more complex language, they are left with little energy for monitoring their errors. This might be one of the reasons why the subjects in the present study were still inaccurate in the posttest. It seems that the subjects consumed all their energy in experimenting with complex structures, and no energy was left for editing.

5.6 Limitations

The present study has a number of limitations. First of all, the duration of the study is short, three weeks. Because of the low keyboarding and word processing skills of the subjects in the experimental group, they spent most of the time typing rather than using the DCMD. Besides, the number of the participants in the study was rather small, 30 students. Though, it is an acceptable number in the area of CALL, generally speaking, it is small and might account for getting insignificant results.

Secondly, the experiment was conducted as an out-of-class activity, and though participation was totally voluntary, the subjects did not take the activities in the experiment seriously. The same problem was applicable to the pretest and posttest.
The subjects did not pay enough attention to their writing, especially in the posttest; they did not revise or edit their writing.

Thirdly, participation in the study was voluntary. This resulted in a heterogeneous sample of subjects in terms of language proficiency, their scores ranged from 50% to 96% on the proficiency exam. It is worth mentioning that the proficiency level of some of the participants was very low to the extent that their linguistic resources were not sufficient enough to participate in discussions. Some of them did not have enough grammatical knowledge to edit their writing. Thus, even if DCMD had a positive impact, it would not be obvious with those subjects and in the short duration of the study. The very low proficiency of some of the participants resulted in paragraphs that were not understood by their colleagues. Thus, the subjects were exposed to incorrect English and they did not benefit from interaction.

Fourthly, the subjects in both the experimental and control groups did not engage in discussion. The subjects wrote their contributions, read the responses of some of their colleagues, but did not respond back to each other’s contributions. In fact, there was no evidence of interaction.

Besides, it is worth noting that the subjects did not fully experience the asynchronous nature of DCMD. It is true that they were not required to send their contributions on the spot, but they had to finish the activity in the time limitation of two hours, which is the period of staying at the Internet café each session.

Another limitation of the study is that no delayed posttest was conducted to measure the impact of the treatment in the long run.

5.7 Future Research

Future research should take into consideration the duration of the treatment.
The treatment should be administered for a longer period of time to measure any acquisition gains. Larger sample sizes should also be used.

The treatment, the pretest and posttest should be integrated in class activities to guarantee better student participation and to motivate the learners to participate. Learners with insufficient linguistic resources should be excluded from the participants for a number of reasons. First of all, any improvement on their part will take a longer period of time. Secondly, because of their very low proficiency, they might not be able to provide intelligible production. Hence, other students will be exposed to a deformed version of the language, which might result in fossilization of errors and prevent any chances of interaction.

The impact of DCMD on the grammatical accuracy of learners needs to be examined with grammatical features other than tenses, articles, prepositions and tenses. It also needs to be examined with students in different educational levels, e.g. primary, secondary, higher studies…etc. Other features of accuracy such as vocabulary, pragmatic competence and sociolinguistic competence need to be investigated. Forms of asynchronous CMC, other than DCMC could also be investigated to reach comprehensive conclusions about ways of implementing CMC in EFL classrooms.
REFERENCES


# Appendix A: The Scoring Rubric

## Grammatical accuracy

Grammatical accuracy will be examined in terms of the acceptability and precision of the use of the following grammatical features:

1. **Subject/ Verb agreement:** means that the verb must agree in number with its subject. The students might produce errors like "The soldier *fight* hard" or "My friend *have* changed her mind".

2. **Articles:** There are three articles "the", "a" and "an". "The" is a definite article because it usually precedes a specific or previously mentioned noun." A" and "an" are indefinite articles because they are used to refer to something in a less specific manner (an unspecified count noun). The students might produce errors like "a father of my friend called me yesterday".

3. **Prepositions:** are words that normally precede nouns or pronouns and show the relation of this noun or pronoun to some other word in the sentence, i.e., time, and place. Students might produce errors like "I will travel *in* Monday ". It can also be combined with verbs to create phrasal verbs. Students might use a wrong preposition in the phrasal verb as in "I ran *in* an old professor of mine".

4. **Tenses:** are grammatical categories of verbs used to express the time in which the action occurs (present, past, future, etc). Students might produce errors like "they *are* usually *coloring* eggs at Sham El Nessem".