The Impact of Computer-mediated Communication on EFL Learners' Oral Performance

by

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BA, University of Kashan, 2012

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Supervisory Committee

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Abstract

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Since the advent of the Internet as a means of communication, more and more people have been using electronic media for a variety of purposes including interpersonal communication, sending and receiving information as well as language learning purposes. Therefore, a line of research in this area seems necessary to gain a better understanding of various aspects involved in this topic and identify its possible advantages. To this end, the present study was an attempt to investigate the effectiveness of an online messaging application, namely WhatsApp Messenger, which is an example of computer-mediated communication tool where both synchronous and asynchronous online communication can occur, on Iranian intermediate EFL learners' syntactic complexity. This research was an experimental study and had a pretest-posttest design. This study had an experimental and a control group. The participants in the experimental group of this study were 15 adult intermediate language learners. They were asked to participate in eight discussion tasks and post on WhatsApp Messenger for a period of two months. The quantitative analyses were carried out by running independent samples t-tests as well as Mann-Whitney *U* tests to determine the differences in terms of syntactic complexity. The results revealed that using WhatsApp Messenger for communication practice had significant impacts for this group of learners on eleven measures of syntactic complexity. In addition, a survey questionnaire was administered to further delve into the participants' perceptions and beliefs about their experience of computer-mediated communication. The results showed

that participants found this messaging tool helpful and were satisfied with it in terms of comfort level. Participants also showed positive feedback toward the design and implementation of the study.

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Dedication

I dedicate my thesis to my family and many friends. A special feeling of gratitude to my loving parents, Gholamali Bagherbeigi and Azam Shakoori, whose words of encouragement and push for tenacity ring in my ears. My brothers Masoud and Saeed have never left my side and are very special. I also dedicate this thesis to my many friends and colleagues who have supported me throughout the process. I will always appreciate all they have done, especially Behrouz Hosseini for helping me develop my research and technology skills. I dedicate this work and give special thanks to my best friends Niloofar Aalam and my wonderful sister Golshan for being there for me throughout the entire master's program.

Chapter 1
Introduction

1.1 Background

Technology is considered to be fast and changing so quickly that many believe its acceleration cannot be measured. The same goes for the technology-related aspects of applied linguistics as well. Over the past decades, profound changes have occurred in the technologies, which, in turn, have affected second language teaching, assessment, research, and many other aspects of a second language learning as well. With this in mind, there are many important questions that need to be answered with regard to technology and its impact on second language acquisition. These questions mainly address the effect of technology on different aspects of language learning in general and how technology can efficiently be incorporated in this process so that language learners, teachers and researchers can receive all the potential benefits technology has to offer (Chapelle, 2003).

In order to answer these fundamental questions, one of the areas that has recently attracted increasing attention of the researchers is the use of computer-mediated communication through the Internet as the use of computers and mobiles has increased for different educational purposes. Nowadays, language researchers, teachers and learners attempt to take full advantage of computers for language learning purposes. Another question that research in this area has attempted to respond to concerns the divide between synchronous and asynchronous online computer mediated communication as a great deal of attention has been drawn to synchronous and asynchronous computer-mediated language learning (DeBell, & Chapman, 2003). According to Quan-Hasse, Cothrel, and Wellman (2005), both synchronous and asynchronous online computer-mediated

communication tools can be used to aid learning. These tools including e-mail, and chat in virtual environments can help learners communicate ideas, information, and their feelings without any time and space limitation. In addition, one of the advantages of using computers for language learning is that it can be used for the improvement of oral performance. As Sauro (2009) put it, synchronous and asynchronous environments are ideal contexts for developing communication skills; these settings can provide student-teacher interaction in a way that increases students' awareness of the target language as well. On the other hand, a search of the literature shows that interactions if comprehensible can facilitate second language acquisition (Kitade, 2000).

However, the value of using technology in educational setting, possibility of effective communication practice within the virtual environment, and the role of synchronous and asynchronous computer-mediated technologies as a valuable pedagogical tool should be further investigated to gain a better understanding of this environments and the opportunities it can create for language learners and teachers as well as institutions willing to offer online courses. The reason behind this endeavor is that, in limited class time, teachers and students may not have enough opportunity to interact sufficiently and efficiently, hence they may choose to keep contact through computer to promote language learning as the flexibility afforded by computer in terms of time and place for learning has been reported to be a unique characteristic of online learning (Lee & Mendlinger, 2011). Moreover, educational institutions, including language schools and universities, are offering online classes to teach content on the Internet. However, of critical importance to respond, is the

question of which type of computer-mediated communication tools can be more influential for language learning; synchronous tools such as videoconferencing or asynchronous ones like emails? Another crucial consideration in this regard is the learners' perception of using online CMC tools as various research studies have addressed the relationship between students' perception of online CMC and their level of engagement in the learning process or how the tools can be effectively used for the promotion of students' engagement (Tran, 2012; Repman, Zinskie, & Carlson, 2005). If language learners do not perceive these tools as convenient, helpful or interactive, it can hardly be expected that these types of communication tools affect their language learning. Therefore, investigation of the learners' perceptions regarding the impact of online computer-mediated communication practice is necessary.

1.2 Purpose of the Study

More and more people use state-of-the-art technologies available to achieve their purposes in different areas such as medicine, business, and education, to mention a few, and there has been a vast increase in the use of computers and the Internet among people over the last decades. Online communication is now part of our lives as people from different parts of the world wildly communicate using synchronous or asynchronous communication tools (Warschauer, 2001).

Technology is also making its way into language classrooms. Computer-mediated communication (CMC) also has recently received recognition for its ability to enhance foreign language performance by promoting a positive learning environment which in turn can lead to more interactive discourse (Abrams, 2001; Darhower, 2002). However,

considering the pace at which new technologies are being introduced, there seems to be an urgent need for the investigation of their effect on online language learning and this pace could be the reason why researchers assume the importance and scarcity of further empirical evidence on the effectiveness of online learning (Sheard & Markham, 2005). In other words, Sheard and Markham believe that language researchers and teachers need to make sure that they are responsive to possible changing needs of the learners and the fact that they should offer adaptive-learning online courses.

On the other hand, many of the research studies have so far been concerned with traditional face to face classroom contexts, as they have mainly focused on how the classroom, along with learning resources available in the class can help promote language learning by designing “syllabuses, methods and materials” that “exploit the classroom” to provide opportunities for language learners to communicate (Richards, 2015, p. 6).

In order to address these main concerns, this research aimed to examine the effect of online computer-mediated communication through emerging technologies in which a group of learners can partake. Specifically, the present study entailed the investigation of the effect of online CMC practice in WhatsApp Messenger on syntactic complexity of language learners’ oral production in an EFL context in Iran. Notably, the assessment of learners' production was narrowed down to syntactic complexity. The reason for the selection of syntactic complexity was that previous research had inconclusive results regarding the effectiveness of online CMC on syntactic complexity (Abrams, 2003). Interestingly by comparison with asynchronous online CMC practice, Abrams’ (2003) study concluded that face-to-face discussions contribute more significantly to oral performance. On the contrary, because of the delayed nature of asynchronous CMC tools,

Sotillo (2000) claimed that learners can have more opportunities to produce syntactically complex language which in turn resulted in a significant improvement in their accuracy of the participants of that study.

As stated earlier, oral performance in this study was measured in terms of syntactic complexity. Syntactic complexity has been defined as "the range of forms that surface in language production and the degree of sophistication of these forms" (Ortega, 2003, p. 492). Notably, the syntactic complexity indicators chosen for automated analysis in this study consisted of fourteen indicators (Lu, 2010). These indicators have already been addressed in Wolfe-Quintero, Inagaki, and Kim's (1998) and Ortega's (2003) studies (as cited in Lu, 2010). In searching for the best indicators to measure complexity, Wolfe-Quintero et al. (1998) thoroughly examined 39 studies from English, French, Swedish, German and Russian.

Previous research findings indicate that high-level language learners display strength in syntax (Bardovi-Harlig, & Bofman 1989), as developing language ability includes syntactic complexity as well as discourse and sociolinguistics competence (Ortega, 2003). It also has been reported that written and oral language can be analyzed through the same indicators, particularly when the goal of producing the language is communication as studies of language development have revealed that "analysis works equally well for oral and written production" (Larsen-Freeman, 1983, as cited in Bardovi-Harlig, & Bofman 1989, p. 19).

These indicators of syntactic complexity have further been classified by Lu (2010) and fall under the following five primary categories: The first category consists of three indicators that measure length of production namely, mean length of clause (MLC),

sentence (MLS), and T-unit (MLT). The second category which measures overall sentence complexity has only one indicator called sentence complexity ratio (C/S). The third category consists of four indicators that show the amount of subordination. These indicators are T-unit complexity ratio (C/T), complex T-unit ratio (CT/T), dependent clause ratio (DC/C), and dependent clauses per T-unit (DC/T). The next category type has three indicators demonstrating the amount of coordination, including, coordinate phrases per clause (CP/C), coordinate phrases per T-unit (CP/T), and a sentence coordination ratio (T/S). The fifth category has three indicators investigating the relationship between particular syntactic structures and other production units, including complex nominals per clause (CN/C), complex nominals per T-unit (CN/T), and verb phrases per T-unit (VP/T). According to Lu (2010), the way this web-based computational tool works is that first the samples, which should be in text format, need to be put in the analyzer for analysis. Later, the automated analyzer counts the number of times each of the syntactic units occur. Once the counting phase is done, the analyzer outputs indices for each indicator based on the calculations.

1.3 Research Questions

This study focused on examining the effect of online CMC practice on L2 oral performance, which was assessed in terms of the syntactic complexity. Additionally, the learners' perceptions toward this type of learning was investigated through a survey questionnaire as investigation of learners' attitudes has been stressed by researchers within the framework of a sociocultural perspective (Léger & Storch, 2009). The second research question is motivated by the fact that, according to researchers in this field, learners are agents who actively engage in the learning process, which in turn necessitates the

examination of their beliefs to better capture their perceptions (Lantolf & Thorne, 2006). The importance of the investigation of perception has been pinpointed as the social experiences of the language learners play an important role in the internalization of a second language (Goertler, 2006). Along the same line of research, Skehan (1998) also stresses that learners should be the main focus of the learning process.

To attain the aims of this study, the following research questions and hypotheses were formulated.

Q1. Does online computer-mediated speaking task have any effect on Iranian intermediate EFL learners' oral performance in terms of syntactic complexity?

In order to investigate the research question empirically, the following null hypothesis was formulated based on the findings from previous research:

H_0. Online computer-mediated speaking task does not have any effect on Iranian intermediate EFL learners' oral performance.

Q2. How do the intermediate EFL learners perceive the effectiveness of online computer-mediated speaking task?

Regarding syntactic complexity, it needs to be stated that literature in the field associates improved language performance with students' use of syntactically complex language (Abrams, 2003).

1.4 Significance of the Study

With the advancement of technology and the introduction of the Internet as a means of communication, more and more people have been using electronic devices and media for a variety of purposes including interpersonal communication, information transmission, and language learning and teaching, to mention a few (Hosseini, 2013). In fact, upon the

increase in the accessibility of computers and the Internet, the use of computer-mediated communication has increased both inside and outside of the classrooms (DeBell & Chapman, 2003). It has been proposed that the application of computer and the Internet can have a positive impact on language learning as communication through the Internet has been claimed to have a significant effect on the motivation of students, which helps them improve their communication skills both in oral and written forms (Hosseini, 2013). In addition, it has been claimed that online tools can be convenient for both language learners and teachers as it can create a constructive environment (Yeh & Lo, 2009). Furthermore, the social, meaningful, and motivating form of communication is in line with current theoretical and pedagogical trends in SLA (Kim, 2014). According to Goodman and Graddol (1996), computer-mediated communication could play a significant part in promoting language learning in general, and accuracy in particular because computer-mediated communication can lead to teacher-student interaction focusing on linguistic accuracy of the learners as well. According to Chun (1994), computer-mediated communication can demonstrate great potential to provide a useful tool for second language development. Also, Savignon (1983) proposes that learners' meaningful practice can lead to better oral skills. Furthermore, it has been claimed that learner-to-learner interactions can enhance learners' communicative ability (Gass & Varonis, 1994; Long, 1996). However, due to scarcity of research investigating the possible effects of online CMC on syntactic complexity, examination of its potential contribution to learners' oral production of syntactically more sophisticated language is of necessity (Abrams, 2003).

Additionally, it has been reported that developing speaking skills for language learners to communicate appropriately and effectively is one of the main objectives of their

learning process (Payne & Ross, 2005). As a result, for language instructors and researchers, developing and implementing engaging activities for learners to achieve their aims is of particular interest. To fulfill this objective, depending on learners' needs, current foreign language instruction methods include oral activities for learners, which can help them improve their oral proficiency (Payne & Ross, 2005). In addition, it has been proposed that concerning the effect of computer-mediated communication, more studies need to be carried out for the assessment of oral performance via emerging technologies (Hirotani, 2014).

Also, a search of the literature shows another gap in existing research concerning the scarcity of studies on task-based language teaching and CALL in "non-Western contexts" such as Iran. It seems that more findings from that context can prove helpful in making educated decisions on using online CMC in second language acquisition (Thomas, Reinders, & Warschauer, 2012, p. 343). It has been concluded that future research on technology should focus on more real-world settings such as online CMC messaging application to reap the potential benefits of using them in SLA.

In view of the above-mentioned considerations and for the purpose of finding further research evidence on this topic, this study was designed to explore the effectiveness of computer-mediated technologies on improving learners' ability in oral performance. With this intention, 30 Iranian intermediate EFL learners above the age of 19 studying at the Iran Language Institute (ILI) were recruited and randomly assigned into two groups including one experimental and one control group, each consisting of 15 participants. ILI is a state-owned language school in Iran currently having around 200 centers in 73 cities, which offers language courses in Persian, English, French, German, Russian, Spanish and

Arabic. While the control group received no treatment, the participants in the experimental group received treatment, which was online computer-mediated speaking tasks on WhatsApp Messenger for a period of two months. Participants in the experimental group could go into the discussion group created by the researcher on WhatsApp Messenger and post as many comments in the form of voice messages as they wanted on the topic that was assigned by the researcher. WhatsApp Messenger, which is a free messaging service owned by Facebook, can be accessed through both computers as well as other portable electronic devices such as mobile phones, tablets and laptops. At no cost, users of WhatsApp Messenger can post text, video and audio messages using phone Internet connection. Also, photos and documents can be sent through WhatsApp Messenger. This application also allows users to make both audio and video phone calls. Users do not need to pay any fees to use this application. Another useful feature of this messenger is that "Students can work individually, in pairs, and groups, or as a whole class" (Gündüz, 2005, p. 200). Lastly, the messages are saved on WhatsApp servers until they can be delivered to the receiving phone, which makes it possible for users to leave messages even if they are not online. This feature of WhatsApp gives users the chance of asynchronous communication and can remove the challenges some users face with regard to slow connections and how it can affect the opportunities of language learners to participate. Previous research states that learners with high-speed connections have more opportunities for communication dominating the group discussions, whereas participants with lower connections may have difficulty, which in turn negatively affects the quality of learners' participation (Lamy, Hampel, & Ebrary, 2007).

In addition, the communication on WhatsApp Messenger is multiway among all the participants of a group which means that learners can receive and respond to messages from all the other participants in the group by clicking on those they wish to respond to.

In conclusion, there is research with contradictory results in the field of SLA with regard to the effect of CMC on oral performance (Abrams, 2003; Hosseini, 2013; Sotillo, 2000). Since previous research has reached inconclusive, mixed results regarding computer-mediated communication, it is difficult to make sense of the research body on the effectiveness of either synchronous or asynchronous communication in the language learning environment. In other words, it seems questionable to assume that learners may or may not benefit from online CMC practice in terms of syntactic complexity. Thus, the present study aimed at filling this gap in the literature by providing more evidence regarding the usefulness of online CMC practice. Moreover, there seems to be an urgent need to further investigate the impact of CMC due to its considerable increase in use through the Internet on language improvement, specifically in oral performance.

In addition, the learners' views and preferences about the effectiveness of CMC for language learning is also a crucial factor. Contrary to the fact that the learners' perception regarding the communication practice can affect the process of language learning, few studies have been conducted to evaluate student perceptions of the helpfulness of CMC tools in online learning (Salloum, 2011). According to Rahimi (2012), there are studies that have focused on students' views and preferences; however, Leki (1991) argued that learners' attitude and preferences for a language learning tool could be sensitive to the context where it is employed as it is "strongly culture-bound" (p. 79). On the other hand, there are research results that indicate the willingness of students to have classroom face-

to-face discussions rather than online CMC discussions (An & Frick, 2006). Accordingly, in-depth investigation of teachers' and students' perceptions about CMC is the first step for providing communication practice in and out of class since there are individual as well as group differences in the effect of CMC on second language learning and also inconsistency of the perceptions in CMC between teachers and students can prevent it from having the desired effect (Horwitz, 2014). In addition, understanding how tools are perceived by teachers and students is crucial since students' perceptions about the value and effect of each tool can match with their improvement in language skills (Lynch & Maclean, 2003). Moreover, it has been stressed that to design an online class, student perceptions and satisfaction should be taken into account as institutions often consider them as important factors and components of the online course (Roach & Lemasters, 2006). Therefore, there is the need to identify factors that affect student satisfaction in online classes, including usefulness, technical skills and attitudes toward online learning as well as comfort level that may affect student satisfaction.

Previous studies have focused either on the impact of synchronous tools on language learning (Kim, 2014; Samani & Noordin, 2013) or on the impact of asynchronous tools (Hosseini, 2013; Hosseini, 2012). Some studies also compared the impacts of both types on language learning (Sauro, 2009; Castañeda, 2005; Shintani, 2015). However, such studies have not addressed the impacts of online messaging applications on the very specific area of syntactic complexity, which is the focus of this study. In addition, very few studies have addressed the learners' perception of using messaging applications for the purpose of language learning (Vinagre & Munoz, 2011; Sauro, 2009).

On a final note regarding the gap existing in previous research, it needs to be pointed out that most of the research regarding syntactic complexity has so far been devoted to learners' writing skill and numerous studies have demonstrated the effectiveness of CMC in these environments (Stockwell & Harrington 2003). As a result, it seems that more investigation should be dedicated to providing learners with an opportunity to communicate orally through computer technologies as well (Henry, 1996). Therefore, there is the need to further investigate the impact of online CMC through asynchronous and synchronous messaging applications on language improvement.

Moreover, since EFL learners and teachers, if able to access computers outside classrooms, can employ synchronous or asynchronous communication, it is desirable to have further conclusive evidence regarding the effectiveness of recent computer-mediated communication tools. Since the learners' perception is also a factor that could impact the effectiveness of language learning tools, the other aim of the study is to focus on the learners' perceptions regarding receiving online computer-mediated communication for learning the target language.

Therefore, it can be concluded that the significance of online CMC and lack of adequate conclusive evidence in this area suggest the need for more research. In addition to these, most of the studies conducted so far concern the earlier forms of text-based CMC. As a result, some of these results may need further evidence for validity within the present multimedia contexts available for online computer-mediated communication (Romiszowski, & Mason, 1996).

Next section defines the key terms used in this study for the purpose of clearly explaining what these terms mean in this research and to avoid ambiguity.

1.5 Definition of the Key Terms

1.5.1 Asynchronous Computer-mediated Communication

As defined by Castañeda (2005), it is the "communication between interlocutors that occurs intermittently and with time delay. Examples of asynchronous technologies include email, text messages transmitted over cell phones, and discussion boards" (pp. 10-11).

1.5.2 Computer-assisted Language Learning

As defined by Beatty (2013), it is "any process in which a learner uses a computer and, as a result, improves his or her language" (p. 7). Computer-assisted language learning**,** in the current study, refers to any difference between the participants' pre-test and post-test scores, which will indicate the degree of effective learning that was facilitated through the use of online CMC.

1.5.3 Computer-mediated Communication

As defined by Castañeda (2005), is "the process of using computers to enhance human interaction. Computer-mediated communication includes both asynchronous and synchronous technologies such as e-mail, bulletin boards, and chat rooms" (p. 11). In the current study, computer-mediated communication is referred to the use of WhatsApp Messenger as a means of communication for the participants of the research to take part in discussion tasks.

1.5.4 Syntactic Complexity

Syntactic complexity in this study is defined as the (1) length of production units, (2) amounts of coordination, (3) amounts of subordination, and (4) phrasal sophistication and (5) overall sentence complexity in participants' oral performance (Lu, 2010).

1.5.5 Synchronous Computer-mediated Communication

According to Castañeda (2005), synchronous computer-mediated communication is the "communication between sender and receiver that occurs at real time and without delay, examples of which are telephone conversations, board meetings, voice conferencing, video conferencing, and electronic chat" (p. 14).

Chapter 2
Literature Review

This chapter seeks to give a detailed account of the past and current views and findings related to the research questions raised for this study. This chapter has been divided into three main sections to address the various relevant aspects involved. The first section reviews syntactic complexity, its theoretical basis, and previous research findings. The second section provides some theoretical background research with regard to computer-mediated communication, the related factors affecting the use of computer-mediated communication, and its impacts on language learning. Finally, the last section gives a detailed account of synchronous and asynchronous online technologies. This chapter also evaluates the present state of previous research pertaining to the topic chosen for this study. Additionally, this chapter will discuss research carried out in this area and review previous research conducted to compare synchronous and asynchronous computer-mediated communication. Moreover, it makes an attempt to link different areas of research with the theoretical justifications so as to shed light on why further research and analysis is required in the view of the shortcomings identified in previous research findings.

In many educational settings, the use of computer-mediated communication can be considered as a supplement to traditional face-to-face language classes. With the widespread use of online learning environments and the advent of new technologies adopted for teaching and learning a foreign language, it has become increasingly important to employ these network technologies to promote teacher-learner and learner-learner interaction and to provide EFL learners with more communication practice opportunities

and other types of support. Computer-mediated communication technologies should be considered as supporting tools since they have the potential to provide learners with a means to practice and use language in a natural, meaningful, and realistic context with other language learners and teachers (Castañeda, 2005). Other advantages of online CMC can be language learning classes which are offered on demand at any time requested as well as removing location limitations, transportations costs along with cutting initial and maintenance costs for classroom space which could be considerable (Roach & Lemasters, 2006). Due to these advantages, many studies have focused on the effect of online computer-mediated communication on language learning and the benefits or limitations it may have for language learners along with teachers and schools which offer online language courses (Hrastinski, 2008).

2.1 Syntactic Complexity

Concerning syntactic complexity, which is the dependent variable of this study, a crucial question that many second language development studies have attempted to respond is to what extent the existing syntactic complexity measures are valid in terms of second language learners' proficiency in the target language. The question of validity of these syntactic complexity measures and their correlation with second language proficiency is a fundamental question as the reliability of the results of previous research depends on the choice of these measures (Lu, 2010). According to Lu, previous research has dealt with this important consideration as both cross-sectional studies (Bardovi-Harlig & Bofman 1989, Ferris 1994) as well as longitudinal studies (Ishikawa 1995; Ortega 2000; Polat, Mahalingappa, & Mancilla, 2019) have been conducted to investigate the correlation between syntactic complexity and proficiency level of learners in the target language.

Aside from this important concern, it has been proposed that in order to determine the appropriate syntactic complexity indicators that can truly demonstrate second language development, it is important to first compile as comprehensive a list of indicators as possible which draws upon "large-scale learner corpus data" with "rich, meaningful learner and task information" (Larsen-Freeman, 1978, as cited in Lu, 2010, p. 3). As suggested by previous research, for higher levels of correlation between proficiency and syntactic complexity and validity of results, the syntactic complexity analyzer developed by Lu (2010) and adopted for this study consists of 14 syntactic complexity indicators.

Notably, the analysis of syntactic complexity has always been challenging for researchers as this field lacked a reliable automated computational tool that could measure a comprehensive list of indicators for the purpose of a higher validity and reliability (Lu & Ai, 2015). Due to the fact that there was no automated tool that could reliably measure the level of syntactic complexity and the time-consuming effort of measuring it manually, previous researchers examined only a few indicators and analyzed relatively small amounts of data collected from learners (Lu, 2010). These two major issues are the reasons why the development of an automated evaluation tool is of necessity for the purpose of valid analysis of syntactic complexity of learners' target language use.

Ortega (2003, as cited in Lu, 2010) has reviewed the previous research investigating syntactic complexity. Most of the studies conducted have analyzed up to a maximum of four indicators, which may not be an accurate reflection of the level of syntactic complexity in the target language. A search of the literature reveals that previous research has analyzed few syntactic complexity measures and small amount of learner data (Ortega 2003, Wolfe-Quintero et al. 1998). In addition, the issue of variability in different factors such as "the

choice and definition of measures, operationalization of proficiency, language task used in data collection, language learners and corpus size" adds further complications to the task of generalizing previous research findings (Lu, 2010, p. 3).

2.2 Computer-Assisted Language Learning

Latest advances in technology have consequently resulted in the incorporation of computers and electronic media into language learning and teaching settings. Gündüz (2005) maintains that "The computer has changed the way people work, learn, communicate, and play. It is used by students, teachers, and researchers as a learning tool all over the world, as well as by individuals at home to study, work and entertain" (p. 195). Now people can easily communicate with each other from far distances using computer networks (Sproull & Kiesler, 1991). Likewise, Levi (1997) states that computer-assisted language learning (CALL) is "the search for and study of applications of the computer in language teaching and learning" (p. 1). Computer-assisted language learning was similarly defined by Beatty (2013) as "any process in which a learner uses a computer and, as a result, improves his or her language" (p. 7).

Recently, CALL has progressed to become an integral component of learning environments, and as Chapelle (1990), on the importance of CALL, puts it, "instructors need to understand how CALL can best be used to offer effective instruction to language learners" (p. 199). According to Chapelle (1990), one of the major functions of computer and the Internet as a medium used in educational contexts is their capability in enabling students to interact

and communicate with each other as well as with the technology itself, which make is a unique learning tool creating many opportunities for interaction.

Numerous attempts have been made to provide the historical background as well as a comprehensive account of the current status of CALL. Thomas, Reinders, and Warschauer (2012), for instance, stated that CALL dates back to 1960s and the PLATO (Programmed Logic for Automated Teaching Operations) research project which began at the University of Illinois. This research is of particular importance since it proved to be a major turning point in the development of CALL, making CALL later an important educational tool. PLATO had advanced technological capacities such as multimedia display and gameplaying features among many others.

Sanders (1995) also made an attempt to give a detailed account of CALL and the advantages it has to offer in promoting language learning and teaching and the role it can play in enhancing language acquisition. Sanders describes PLATO as “monumental effort” making it one of the earliest but most effective projects which later expanded and was used extensively (p. 9).

Gündüz (2005) is another researcher describing the history of CALL as it follows:

> Although computers have been used since the first half of the 20th century, they were not used for educational purposes until the 1960s. The 1970s witnessed the evolution of CALL as a result of development in research related to the use of computers for linguistic purposes and for creating suitable language learning conditions. In America, the

> computer-based introductory courses in the 1960s were pioneering projects in CALL and were referred to as Computer-Assisted Instruction (CAI). The 1980s have witnessed the spread of computers both in educational institutions and in people's homes. Since the beginning of the '80s, computers have also found their way into many schools (p. 198).

Higgins (1983) was one of the earliest researchers recognizing the difference between using computers as a tool for drilling or a tool which facilitates communication. Earlier versions of CALL were based on traditional drilling exercises which did not prove successful in promoting creativity on the part of the learners (as cited in Farr & Murray, 2016). This period is called "behaviouristic CALL" which researchers believed could only enhance reading and writing skills (Lamy et al. 2007, p. 9). However, later came "communicative CALL" with the spread of communicative language teaching methods, meaning that speaking and listening skills were also the target of language acquisition (Lamy et al. 2007, p. 9). The final move was toward "integrative CALL" staring from the 1990s, showing a profound shift of emphasis with regard to the development of CALL, from teacher-centeredness towards student-centeredness as with the development of constructivism and sociocultural theory of language learning. Also, a wide variety of multimedia educational products were employed in this phase (Lamy et al. 2007, p. 9). This shift gave CALL a role of mediation as focus was put on learners and communication (Farr & Murray, 2016).

As can be seen from the history recounted by previous research and as Gündüz (2005) states, the uses of computers have become “compatible with a variety of approaches, methods and techniques of learning and teaching” (p. 212). He also stresses the importance of the effectiveness of CALL in enhancing all language skills. This viewpoint on CALL is in line with the current philosophy of language learning and teaching, which places emphasis on all the necessary skills required by learners to gain as well as enhancing grammar and problem-solving abilities.

Advanced technology adopted in language learning has made significant contributions to language learning and teaching environments. Recent research indicates that learners with the experience of CMC are more “engaged in real-time communication as well as reflective engagement” through synchronous and asynchronous messaging and applications (Thomas, Reinders, & Warschauer, 2012, p. 343). Likewise, CMC practice has the potential to enable learners to choose the direction discussion topics take. Moreover, ability in the selection and termination of discussion topics has been improved as a result of CMC practice (Kelm, 1992; Ortega, 2000). In addition, learners' attitudes and motivation seems to be more positive in this type of interactive context than in face-to-face discussions (Beauvois, 1994). Regarding the advantages of CMC, Gündüz (2005) points out that, “the computer has changed the way people work, learn, communicate, and play. It is used by students, teachers, and research scientists as a learning tool all over the world, as well as by individuals at home to study, work and entertain” (p. 195).

2.2.1 Computer-mediated Communication

Hiltz and Turoff (1993) used computer conferencing as a means of communication through the Internet. They believe that computer holds great potential as it has "services and options not available in other forms of communication" (p. 9). Along the same line of research, a variety of definitions have been proposed for this type of communication. CMC has been described as "a field of scholarly study" referring to "any human communication achieved through, or with the help of, computer technology" (Thurlow, Lengel & Tomic, 2004, p. 26). CMC can also refer to technologies that are used with the intention of facilitating human communication or information transmission through computers (Herring, 1996). The CMC tools adopted for an online education can include and are not limited to synchronous conferencing, emails, instant messaging, voicemail, Internet forums, online chat, and videoconferencing.

According to Goertler (2009), previous research on the benefits of CMC fall under three main categories. The first concerns the development of language. The second pertains to classroom dynamics, and the last category involves student attitudes. These advantages are discussed in more details in this section.

Those advantages of CMC that concern language development include the effect it has on production of more language in CMC, the promotion of target language use, enhancement of learners' reading comprehension as well as writing skills, to increases learners' language output as well as providing a great range of language functions through discourse (all cited in Goertler, 2006).

Some other benefits of employing computer-mediated communication regarding classroom dynamics identified by various researchers and pinpointed by Goertler (2006) are highlighted as they follow: activating passive students, decreasing dominance of the

teacher, giving shy learners and members of the minority groups the opportunity to participate to an equal degree as other participants and providing an opportunity for a more open discussion of topics.

The benefit that fit in the third category of CMC benefits, classified by Goertler (2006), consist of reduced levels of anxiety, overall positive attitude of learners toward using CMC. Similarly, with regard to CMC tools and technologies, there is further research confirming that using appropriate CMC technologies can help create a positive attitude and perception of the effectiveness of online instruction for language learners (Beauvois, 1994).

Having been employed in language learning and teaching, previous research claims that computer-mediated communication can be more effective than face to face environments due to the fact that students may feel frustrated with monotonous repetition and practice tradition of language learning and methods of teaching in face to face discussions (Salter, 2003). Salter stresses that CMC has the potential to handle this issue. Likewise, Fey (1998) advocated this idea by stating that computer-mediated communication provides the learners with the opportunity to break the boundaries of classroom and to learn in innovative ways. CMC technologies, such as discussion boards and email, are communication tools which can be used by both students and educational instructors as online CMC can afford opportunities for both language learning and teaching. Similarly, Straub (2009) maintains that CMC technology can be a tool for facilitating communication among students and instructors, and the increased level of access and flexibility of CMC tools have resulted in an increase in innovation in use in the field of online education.

The basis of CMC technology is using computers and communication networks as tools to help facilitate human interaction and communication. CMC aids human communication through computers in various forms of synchronous and asynchronous interactions using text, video, or audio (Straub, 2009). Previous research findings have also demonstrated that CMC can also result in larger amounts of learner output in addition to improved attitudes toward language learning in comparison with face-to-face communication in the classroom (Beauvois, 1994; Blake, 2000; Warschauer, 1995). Beauvois (1998) reported that learners class discussions through electronic tools proved to be effective in terms of stimulation of discussions for the learners and also with regard to its diagnostic capabilities for the instructors.

Eslami, Mirzaei and Dini (2015) examined the role of CMC tasks and activities in the development of learners' pragmatic ability. They found that CMC was successful in raising EFL learners' noticing and awareness.

Yet, another advantage CMC interaction can offer is that they can provide opportunities for authentic language which is usually lacking from face-to-face classroom settings (Goertler, 2009). Another beneficial effect of CMC identified by Barrette (2001), is computer literacy which language learners can achieve if technology is well-incorporated into language classes. Barrette maintains that allotting a small amount of class time to the training required can have a positive effect on how it will be employed by learners. This technical competence has also been stressed by other researchers such as Lamy et al. (2007) as it can affect the quality of contributions.

It seems that computer-assisted instruction developed out of computer-mediated communication has led to new approaches to teaching, from computer-enhanced classes,

to classrooms in which portions of lessons are conducted from distance, to exclusive delivery of instruction in distance courses. In each of these cases, especially during the use of computer-mediated communication activities, the role of the teacher varies from what is observed in the traditional classrooms. That is, according to research on computer-mediated communication in language instruction, a teacher's dominance decreases, and student participation is more voluntary in nature leading to more learner-learner interactions (Goertler, 2006).

Timpson (1999) pinpoints three main changes that can occur as part of classroom activities. These changes can happen as a result of using computer-mediated communication as a teaching tool in lesson delivered to language learners. First, teaching and learning activities such as lectures and presentations can shift toward more student-centered activities such as practice and discussion-based tasks. Second, focus on product changes to a focus on process. It means that instead of focusing on knowledge and skill, critical and creative thinking, communicating and cooperating become the focus of teaching and learning activities. Third, individual context can change to a pair or group contexts which allows for more interaction patterns among learners (as cited in Perez, 2013).

In addition, research on computer-mediated communication in the classroom has identified some advantages such as a positive influence on language development and enhancement of student participation if it is used as a complement to classroom instruction (Goertler, 2006).

Computer-mediated communication can take two forms of synchronous and asynchronous. With a slightly different approach, some aspects of each form are discussed separately.

One of the interesting aspects of synchronous computer-mediated communication is that it includes both written and oral communication discourse features and is becoming a form of communication with its own rules, especially with the young generation of EFL learners. Because of these unique discourse features, teachers must decide how to address the concept of errors in this mode of communication and delivery (Goertler, 2006). Using synchronous computer-mediated communication as a tool for pedagogy first originated in the 1980s at Gallaudet University. It was originally used to help deaf people to communicate with each other and the teacher in English instead of American Sign Language (Batson, 1988; as cited in Goertler, 2006). At the University of Texas at Austin, another course including a synchronous computer-mediated communication feature was developed and implemented in which learners discussed their writing assignments with one another in L1. Then, this idea started to spread to English classes, and it was later concluded that it had numerous advantages for learning various aspects of language (Darhower, 2002).

In addition, it has been suggested that using synchronous computer-mediated communication for language teaching improves the learners' motivation in comparison with those EFL learners who are taught through traditional face-to-face classroom environments. The synchronous computer mediated communication classes provide EFL learners with a variety of channels to communicate with each other. Such channels include

private chats, e-mail and texting. In this way, it can help them search and share information at the same time of discussing issues (Hrastinski, 2008).

The benefits of synchronous computer-mediated communication are not limited to students. Teachers can also take advantages of it if this mode of delivery can be used appropriately. Through using synchronous computer-mediated communication, teachers can get more creative in their teaching. The techniques teachers use for teaching each language skill and sub-skill can be adjusted to be more engaging and appealing for the students. Using synchronous computer-mediated communication, teachers can monitor the learners' process of learning continuously by being in touch with the students over the Internet (Tahriri, Hassaskhah & Mozafarian Pour, 2015).

In a study by Darhower (2002), who investigated the interactive features of synchronous computer-mediated communication, it was concluded that learners took ownership of the chat room, which helped form a dynamic, learner-centered and interactive communication patterns. They discussed topics of interest and other fun features such as joking, teasing, and role plays were also witnessed. The learners used L2 for developing their sociolinguistic competence and as well as for enjoyment. Darhower (2002) explained the findings in the light of sociocultural theoretical framework. In fact, this theory puts emphasis on social aspects of language learning and supports the idea that chat room communication can be used as a tool for language learning.

On the other hand, Maynor (1994) advocated the use of asynchronous computer-mediated communication by stating that asynchronous computer-mediated communication tools can demonstrate characteristics of both oral and written face-to-face communication. According to Kitade (2013), through asynchronous computer-mediated communication,

EFL learners use innovative strategies that take advantage of three major features of asynchronous computer-mediated communication including extra time for comprehending, planning, and producing the messages, the text-based nature of the medium, and the lack of nonverbal cues. However, it is worth adding that the interval of time between the email messages can have both positive and negative impacts on learning. Although learners have enough time comprehending, planning, and producing messages, the pressure to reply to the message is also reduced. Therefore, the learners may later ignore or forget them. According to Maynor (1994) another feature of asynchronous computer-mediated communication is that the messages could be different from those used in ordinary everyday conversations.

Stockwell and Harrington (2003) also mentioned some of the advantages of using asynchronous computer-mediated communication. As they mentioned, using this type of communication, learners can have more time to focus on the linguistic cues without any pressure. They have more time to comprehend the language sufficiently and then respond accordingly, and finally, learners may feel more relaxed and less anxious in comparison with common face-to-face interaction where they are worried about saving face, which can be a source of anxiety.

Being synchronous or asynchronous, computer-mediated communication, in contrast to face-to-face communication, entails anonymity. Because of its written form, it is slower than the spoken language and this characteristic allows the participants to have enough time to edit their messages, to read and re-read other participants' messages, and to simultaneously send messages. In this form of communication, unlike oral communications, messages can be ignored, and the management of turn-taking in some

regards becomes easier. However, the fact that interlocutors can be ignored can lead to chaos in turn-taking (Kern, 1995; cited in Goertler, 2006).

According to Böhlke (2013), participation among students is reported to take place greater in a synchronous CMC rather than in face-to-face discussion groups. Böhlke defines participation as "the distribution of speaker contributions among the participants in a group" where are the contributions no matter how short or long have a discourse function (p. 72).

Moreover, learner autonomy can be achieved through CMC. The final goal of learner's autonomy is to "free learners from the constraints of the normal student/teacher paradigm, allowing them to set their own goals and to make informed decisions about how to achieve those goals" (Donaldson & Kötter, 1999, 536). In this context, Donaldson and Kötter believe that the teacher has the role of a mediator making sure that goals set by the leaners are realistic and can be achieved meaning that the teachers should not be considered as redundant.

In addition to computers, mobile-assisted language learning (MALL) has also been used in language learning. One of the advantages of this type of learning is that, in MALL, language learners do not have to be in classroom or at a computer. As a matter of fact, MALL, with its unique characteristics, can be considered a great supplement to the learning context since it removes the standard problems of time and place limitations that classroom instruction suffers from. MALL can also lead to a "personalized, spontaneous, informal and ubiquitous" learning experience (Miangah & Nezarat, 2012, p. 163). Miangah and Nezarat (2012) maintain that since time and place limitations are overcome by MALL, it

can be a great option and have considerable potential for language learners by liberating them from facing these possible concerns.

2.2.2 Factors Affecting the Use of Computer-mediated Communication

According to Mahdi (2004), there are various factors that could affect computer-mediated communication. One of them is the group size. It was found that group-size influences computer-mediated communication in the classroom, and group connectivity in computer mediated communication has been a topic investigated in previous research (Godwin-Jones, 2009). Böhlke (2013) also investigated the issues of participation and language quality in using computer-mediated communication. He focused on differences according to group-size and language stage. The result of the study revealed that the five-member groups showed no equalizing effect, while the four-member groups did, suggesting that smaller group sizes are necessary to benefit from computer-mediated communication. However, these findings could also suggest that an even number of students per group works better than an odd number of students. It appeared that small group sizes such as two or three are effective because students are forced to talk to each other, and no student can stay silent without the other students noticing and most likely commenting on the fact.

Another effective factor is the task type. A search of the literature shoes that task type and its characteristics are important for interaction as task designed to promote negotiation are claimed to be more effective tools in second language development. (Smith, 2001).

Time and location can also play a significant role in second language acquisition. In general, it has been argued that CMC allows for flexibility in terms of the location and time of the discussions (Goertler, 2009). Nevertheless, in cases where computer-mediated

communication takes place in different locations, students may be required to participate at the same time (synchronously) or may be allowed to participate at different times (asynchronously). In either case, the teacher's role changes because the teacher may not able to observe all group discussions, monitor and provide feedback. Furthermore, if the chat occurs outside of class time, students may be less likely to participate as they may not take the assignment as seriously as they do in classroom settings.

Regarding the role of the teacher, Donaldson and Kötter (1999) also mentioned that the teacher can be viewed as an intruder in a synchronous computer-mediated communication activity which occurs outside of class. They believe there is no need for intervention as it might be considered as intrusion once the discussion is on track and participants are proceeding. The teachers are recommended not to disrupt the ongoing flow of the communication and only help with directing the discussions as the final goal is for learners to become autonomous learners.

Another factor concerns connection quality that may negatively affect the interaction. Slow connections or technical difficulties, according to Donaldson and Kötter (1999) may affect the talk time of the participants as these complexities may prevent learners from becoming eager users of such learning environments.

Modes of computer-mediated communication can also play a part. In other words, communication through text, audio or video can affect language learning experience. A search of the previous studies show that research has been done to compare these modes of delivery. As an example, Yanguas (2010) explored how the learners negotiate for meaning through using video and audio computer-mediated communication. The participants of the study were divided into three groups of videoconferencing, audio-

conferencing, and face-to-face interaction. The findings demonstrated that the three groups were different in terms of the way they carried out negotiations. It was found that visual contact in the video group made a difference. However, no significant difference was found between the face to face control group and the experimental video group.

Research studies on computer-mediated communication have also compared the impact of synchronous written and oral computer-mediated communication and face-to-face classrooms. Sykes (2005), for example conducted a study investigating the effect of three different synchronous CMC practice on speech acts. The synchronous discussions were done through written chat, oral chat and face to face. The results of this study revealed that participants in the written chat group outperformed the participants in face to face and oral chat group with regard to complexity of language and variety of strategies.

Another influential factor is the students' perceptions and attitudes towards computer-mediated communication. Nguyen (2011) investigated EFL learners' perceptions of the computer-mediated communication in a collaborative environment. The study lasted for 12 weeks. Although computer and typing skills were found to be a big challenge in incorporating CMC, the participants expressed positive attitudes toward CMC and described it as a constructive tool.

Another factor that can affect the success of computer-mediated communication is social presence or the feeling that the participants belong to a group. According to Tu (2002), social presence depends on how connected the learners feel to each other. Social presence has the potential to increase social interaction and can encourages learners to discuss with other members. As a result, it can result in feelings of satisfaction in learning can promote collaboration.

In a similar line of research, Ko (2012) investigated the impact of synchronous computer-mediated communication learning environments on learners' oral language development. The twelve Taiwanese participants of this research were learning French as a foreign language (FFL). They were assigned into three groups of Audio/video, audio and face to face setting for a period of 18 weeks. The findings indicated that task design and learners' strategy use had significant impact on learners' oral proficiency. However, all experimental settings were effective in helping students develop speaking skills.

2.3 Previous Research in the Area of Synchronous and Asynchronous

The impact of synchronous and asynchronous computer-mediated communication on different aspects of language learning has been investigated by many researchers. They either focused on the effect of one type of computer-mediated communication or compared the impact of synchronous and asynchronous computer-mediated communication. Therefore, in this part, first the studies related to synchronous communication are presented. Then, this section continues with the research on asynchronous computer-mediated communication, and finally, the studies with comparative views are discussed.

2.3.1 Research Related to Synchronous Computer-mediated Communication

Two types of computer-mediated communication can be defined. One of them is synchronous computer-mediated communication which is referred to as communicating in real time via chat or discussion software. In this type of communication, all the participants are online and have the opportunity to interact at the same time. Nevertheless, in another type of computer-mediated communication, namely asynchronous computer-mediated communication, people communicate in a delayed fashion by computer. One instance of this type is using email (Hosseini, 2013). In accordance with the types of computer-

mediated communication, EFL learners can interact either through synchronous or asynchronous communication. Several studies have investigated the effect of synchronous computer mediated communication on various aspects of language learning (Smith, 2005; Darhower, 2002; Fiori ,2013).

Sauro (2009) explored the impact of synchronous written computer-mediated communication on L2 grammar learning. In the research he conducted, 23 intermediate and advanced EFL learners participated. The participants received feedback on the target form by being engaged in open-ended computer-mediated collaborative writing activities. The result of the study indicated signs of gaining knowledge of the target form for the participants in the experimental group.

Another study that investigated the different learning opportunities of synchronous computer-mediated communication from an interactionist perspective was Hung and Higgins' (2016) research. They recruited 12 participants to compare text-based and video-based synchronous computer-mediated communication tools. Results revealed that text-based SCMC was more effective for learning target-like language. On the other hand, video based SCMC was found to be effective for fluency together with pronunciation enhancement.

Rezai and Zafari (2010) focused on the impact of synchronous written computer-mediated communication on the EFL learners' oral proficiency. Totally, 30 EFL learners at university level took part in this study, and they were required to pair and take part in weekly discussions of topic online. The results of this study indicated that participants' oral proficiency improved as a result of the treatment. In addition, based on the participants' responses to a survey and the results of the proficiency test, online discussions were found

to be more beneficial for the less proficient and shy learners. The findings suggested that synchronous written computer-mediated communication can assist teachers in providing opportunities for the learners. Online CMC can go beyond the traditional teacher-centered classes and promote more learner-learner interactions. In addition, this learning environment is claimed to cause lower levels of anxiety.

Razzaghifard and Razzaghifard (2011) investigated the impact of synchronous computer-mediated communication on the EFL learners' grammar learning. The participants were 45 lower-intermediate level language learners assigned into two experimental and one control group. The participants in the experimental group were required to do tasks and later receive written feedback through chat. The result indicated the learners in the experimental group outperformed the participants in the control group.

Using mixed method research, Li (2012) examined the impact of synchronous written computer-mediated communication on the second language development. In total, 44 EFL learners participated in this study. Grammatical and lexical complexity, accuracy as well as fluency were the dependent variables chosen for the study. The findings obtained revealed that synchronous written computer-mediated communication can be effective in terms of both outcome and the processes in target language acquisition. Synchronous written computer-mediated communication was reported to be beneficial for both accuracy and fluency in writing and was beneficial in engaging learners in arguments as the participants included opposing views in their discussions and building strong arguments. However, one feature which was noticed and pinpointed by the researcher in synchronous CMC was the use of short, simple structures. This feature, according to the researcher, can negatively affect academic writing skill of the learners.

Another example of a study that investigated the effect of synchronous computer-mediated communication on grammar learning is the one conducted by Samani and Noordin (2013). The participants of this study were 30 adult male students at university level. They received feedback through chat sessions via Yahoo messenger. The findings revealed that the learners who received feedback through synchronous computer-mediated communication improved in terms of grammar. As a result, Samani and Noordin suggest the use of online CMC in introduction of grammatical structures.

Fiori (2013) investigated the development of grammatical competence as a result of consciousness raising through synchronous computer-mediated communication. In total, 44 EFL learners in two groups; 27 took part in of form-and-meaning-focused and the remaining 17 participated in the meaning-focused group. Participants in both groups attended chat sessions online on a weekly basis. The findings indicated that synchronous CMC can be beneficial for grammatical development.

Payne and Whitney (2002) explored the development of oral proficiency through synchronous computer-mediated communication. In this study, there were 58 participants in two groups. One group received online CMC treatment and the other received face-to-face instruction. The course content was the same for both groups, and discussion sessions were held through online and face-to-face classroom. The findings indicated that oral proficiency can be improved through chat room interaction as the learners in the experimental group performed significantly better than their counterparts in the control groups. Payne and Whitney also make a distinction between face to face and online CMC. One difference concerns turn-taking. They believe there are no rules regarding this feature in online conversation groups. Although this does not work in a language classroom,

learners in online settings do not follow any rules or wait when taking turns. Also, language learners in classroom may be present but only be passive as they may not actively contribute to class discussions. However, in online discussions, actively engaged group members ask about the reason why participants do not take part in discussions. Another distinction made is about using language for the purpose of communicating. In a classroom setting, second language learners may use non-verbal strategies to communicate their ideas, as the focus is on communication. However, it is necessary for language learners in a synchronous online setting to use their language skills rather than non-verbal cues to communicate ideas.

Kim (2014) also investigated synchronous computer-mediated communication and the learner's perception regarding receiving this feedback through this online CMC mode. Participants of this study were university 28 male and female students taking classes at intermediate level of English proficiency in the United States. The analysis of data collected from different sources suggested that the learners benefited from synchronous computer-mediated communication. Kim argued that synchronous computer-mediated communication can enhance learners' ability in error noticing. However, learners felt more pressure during interactions due to the heavy cognitive load they had when typing and taking turns.

Abrams (2003) summarized the similarities and differences between synchronous and asynchronous computer-mediated communication, all of which could arguably influence the amount and the complexity of the language learning. The similarities include extensive negotiation of meaning among the learners as well as between teachers and learners. Also, both synchronous and asynchronous CMC offer more opportunities for

learners to talk in comparison with face to face classroom settings. Moreover, this increased amount of talk time can lead to "richer and more diverse lexicon". Abrams maintains that similar written codes are used for both and the register between the two modes is also the same.

However, these two modes of communication, namely synchronous and asynchronous CMC, are different in several ways. Synchronous communication entails immediate responses. However, asynchronous communication entails extended planning, and time to encode and decode online messages. The second difference identified concerns the use of outside resources. In synchronous communication it may be cumbersome, whereas in asynchronous communication, there is no limit regarding the use of outside resources. Finally, synchronous communication requires social immediacy of users, while in asynchronous communication users are not immediately present (p. 159).

2.3.2 Research Related to Asynchronous Computer-mediated Communication

Some other studies examined the impact of asynchronous computer-mediated communication on language learning to identify its main features (González-Bueno, 1998). Asynchronous computer-mediated communication, as defined by Castañeda (2005), is the "communication between interlocutors that occurs intermittently and with time delay. Examples of asynchronous technologies include email, text messages transmitted over cell phones and discussion boards" (pp. 10-11), whereas synchronous computer-mediated communication, as Castañeda (2005) defines it, is the "communication between sender and receiver that occurs at real time and without delay. Examples of online synchronous communication include telephone conversation, a board meeting, voice conferencing, video conferencing, and electronic chat" (p. 14).

A handful of studies have investigated the effect of asynchronous computer mediated communication tools (Frank & Toland, 2002; Fotos, 2004). One study that examined the effect of asynchronous computer-mediated communication is Gleason and Suvorov's (2011). They examined the learners' perception of asynchronous computer-mediated communication for the EFL learners' oral proficiency. In this study, ten students from different nationalities who learned English as a foreign language participated. They were required to provide feedback on the peers' performance. The result indicated that asynchronous computer-mediated communication can be an effective tool for language learning provided that it facilitates interaction and negotiation of meaning.

Vinagre and Munoz (2011) investigated the effect of an asynchronous CMC tool, namely email errors recycling and accuracy. In the research they conducted, 70 EFL learners participated and they were all required to provide written corrective feedback to their partners. The data collected came from e-mail messages, language learning diaries, self-evaluation questionnaires and personal interviews. The study had a quantitative and a qualitative phase and the findings revealed that the participants of the study showed willingness to contribute by correcting their peer throughout the e-mail exchange and used a variety of correction techniques to draw attention to forms. In addition, signs of autonomy were noticed in collaborative email exchanges of the participants.

Hosseini (2012) investigated how asynchronous computer-mediated communication can contribute to the EFL learners' preposition learning. He recruited 45 elementary learners. They were required to submit two emails. The first was their regular homework assignment and the second e-mail was a revised draft based on the feedback they received from the researcher each week. Participants could use computers or laptop

outside of the classroom for the submission of emails. Based on the results of that study, it was concluded that asynchronous computer-mediated communication could have a significant effect on increasing the correct use of prepositions.

Hosseini (2013) further examined the impact of asynchronous computer-mediated communication on other area of grammar which was the correct use of the present tense. The participants of this research study were 45 Iranian elementary EFL learners, who were randomly assigned into two experimental groups, receiving explicit and implicit feedback respectively, and one control group receiving no treatment. The participants used email to do their assignments and received feedback later. The findings indicated that explicit corrective feedback through asynchronous CMC significantly improved the correct use of English present tenses. The findings of that study also provided further support for the efficacy of asynchronous computer-mediated communication for grammar learning.

AbuSeileek and Abualsha'r (2014) attempted to investigate the impact of using asynchronous computer-mediated communication on EFL learners writing by recruiting 64 intermediate EFL learners. The participants' writings were considered regarding content, structural organization at both text level and sentence-level, grammatical accuracy, lexical appropriateness, punctuation, and spelling. The findings indicated that receiving asynchronous computer-mediated communication from peers enhanced students' writing performance as they scored better on writing test.

2.3.3 Research with a Comparative View

One type of communication practice that has been recently introduced to the field of language teaching and learning is computer mediated. EFL learners can send or receive information through different types of computer-based tools (AbuSeileek & Abualsha'r,

2014). Likewise, Yeh and Lo (2009) believe that computer-mediated communication can play an important role in EFL learners' language development.

Previous studies indicate that researchers have found both synchronous and asynchronous computer-mediated communication effective for language learning (Hrastinski, 2008). However, some researchers have specifically looked at the differential impacts of these two modes of delivery. For example, Castañeda (2005) investigated the online CMC with EFL learners through different modes of communication. In the study Castañeda conducted, the learners participated in bulletin board (as asynchronous communication) and chat room discussions (as synchronous communication). Meanwhile, the teachers participating in that research were asked to provide feedback in online asynchronous and synchronous environments. The results suggested that feedback was more effective in the asynchronous environment than it was in the synchronous environment.

Hsieh's (2009) research is another study which had a similar approach. Hsieh compared the differential impacts of three different methods of delivery. This study was of quasi-experimental in design and as many as 138 language learners participated in that study. Following the recruitment of participants, the language learner participants were assigned into three groups: two experimental including one synchronous and one asynchronous, along with one control group receiving tradition face to face grammar translation instruction. As for treatment, the researchers assigned a computer-mediated discussion task to participants in the two experimental groups and traditional reading assignments along with face-to-face teaching strategies to the control group. The experimental groups also took a comprehensive survey reflecting on their perceptions

concerning the computer-mediated discussion task they took part in. The results of the study demonstrated that synchronous and asynchronous online communication improved reading more than traditional English learning methods. Besides, no significant differences were found between synchronous and asynchronous groups in relation to the effects of computer-mediated communication on English reading comprehension. Both modes of communication seem to be equally effective in increasing reading comprehension. The participants in synchronous and asynchronous communication groups had the same perceptions toward the treatment they received and showed positive attitudes toward the treatment.

Perez (2013) also investigated the impact of synchronous versus asynchronous computer-mediated communication on EFL production. In that research, 24 EFL learners participated and experienced both electronic dialog journals, as asynchronous computer-mediated communication tool or chat room discussions, as a synchronous computer-mediated communication tool. Qualitative analysis of the data revealed that half of the students preferred the chat room sessions while the other half expressed satisfaction with the asynchronous CMC mode adopted. Overall, all the participants expressed a positive attitude toward receiving online CMC instruction. However, they believed using email messages, they had more time to think while writing so that they were more relaxed during the activity. Unlike this group, participants who used chat rooms required immediate responses. Despite this difficulty, the chat room sessions had some advantages over the email assignments. Participants could chat with each other about the topics of interest while the instructor's role was to facilitate the conversation. Students asked for the instructor’s feedback about the production of new words and the instructor or peers could immediately

answer the questions. But advanced students experienced more freedom in email messages, which is one of the characteristics also identified by Absalom and Pais Marden's (2004) as well, because they could use other tenses and vocabulary not yet seen in class and some students reported that email helped them to work at their own pace to look up the words they did not know. In summary, Perez concludes that there were no significant differences between the two modes of delivery, namely synchronous and asynchronous CMC in that study. Both asynchronous and synchronous computer-mediated communication methods were found to be beneficial for EFL learning. However, participants were more motivated as the experienced a non-threatening environment which decreased learners' anxiety levels and they showed improvement in terms of language productivity and enrichment.

AbuSeileek and Qatawneh (2013) compared the impact of synchronous and asynchronous computer-mediated communication on the types of questions and strategies learners adopt. AbuSeileek and Qatawneh recruited intermediate EFL learners who were later assigned in two treatment groups: one group using synchronous CMC and the other using asynchronous CMC. The result indicated that learners who used asynchronous computer-mediated communication performed significantly better than their counterparts in synchronous computer-mediated communication group in terms of variety of question types and strategies. In discussing their findings, AbuSeileek and Qatawneh believe that their study results are not consistent with previous research (Abrams, 2003; Sotillo, 2000) and they speculate that the discrepancy could be attributed to the level of anxiety or the proficiency level of the participants as they were not advanced language learners and their identities were disclosed during online discussions.

Shintani (2015) focused on the effects of synchronous and asynchronous computer-mediated feedback on the EFL learners' writing and the learners' perception regarding the feedback they received highlighting on the potential synchronous CMC can hold for language learning. The participants of this study were two Japanese university students whose perceptions toward synchronous and asynchronous CMC were also investigated in a follow-up interview immediately after the treatment sessions ended. Shintani (2015) found evidence of synchronous CMC over asynchronous CMC. In addition, the synchronous CMC participant showed signs of noticing linguistic forms, which can be seen as an opportunity for learners to use the feedback they receive more efficiently in their language learning process.

Concerning the benefits of computer-mediated communication, each type, including synchronous and asynchronous communication, has its own characteristics and advantages in the area of language learning. With respect to the asynchronous computer-mediated communication, Ajabshir (2019) highlights the advantage that the asynchronous mode of delivery allows learners more time to plan and use support from any external support if required. In asynchronous conversations, learners have more time than synchronous conversations. As a result, non-fluent learners may benefit more from this setting where there is not pressure on learners to process information quickly since asynchronous conversations increase processing time and give users the opportunity of reading and listening comments more than one (Payne & Whitney, 2002).

Williams (2005), for instance, stresses the importance of time pressure. According to Williams this factor affects the elements of input that learners may notice. As a result, the fact that learners are in no time pressure to process the messages they receive, as they

do in synchronous CMC, asynchronous communication gives learners more time to process both form and meaning. This can also be beneficial as it helps learners notice a wider range of language forms in the input than they might notice in synchronous spoken input where the learners feel the pressure of time. In addition, the increased online planning time made possible by asynchronous communication practice could also be useful in that it gives learners more time to attend to target language forms.

Jonassen and Kwon (2001) also compared CMC with face to face interactions. According to their findings, language learners showed higher levels of both reflection and critical thinking. Length of production was also another factor which was investigated. Participants in the CMC group produced longer messages that the participants in the face to face group. In addition, the results of content analysis revealed that CMC group participants exchanged more ideas and perspectives in comparison with the face to face control group.

Furthermore, since asynchronous communication tools do not occur in real time, learners have more opportunities to reflect and produce syntactically complex language which can led to a significant improvement in their writing accuracy of participants of Sotillo's (2000) study.

The usefulness of asynchronous computer-mediated communication has been also supported by other researchers such as Warschauer (2001) who emphasized the role online CMC and stated that employing technology can help learners improve their language proficiency along with their motivational levels once the learners know what the purpose of the CMC activity is. Warschauer also stresses the importance of structuring the activities in a purposeful manner to achieve results. The planning includes but is not limited to the

choice of topics and tasks. Another aspect Warschauer adds to the context of online CMC in addition to synchronous and asynchronous settings is reading and writing texts on the Internet which can be valuable as well.

Regarding the choice of the CMC tools, it is assumed that in the foreign language learning environment, the use of synchronous versus asynchronous computer-mediated communication depends on the learning goal. In line with the goal of the course or program, the instructor or syllabus designers may choose one over the other. While some instructors use asynchronous computer-mediated communication software, such as message boards, others prefer synchronous communication. This issue concerns the special characteristics of each type of computer-mediated communication and the goals learners pursue.

Concerning the findings, researchers have found inconclusive evidence regarding the impact of using synchronous and asynchronous communication on language learning. For instance, while Chun (1994) found that the use of chat leads to a lack of language complexity, Gonzales-Bueno (1998) found an increase in complexity. Abrams (2003) also compared different means of computer-mediated communication in respect to some of the benefits identified by previous researchers. She found that the asynchronous computer-mediated communication produced less output than the synchronous with respect to lexical richness and density and syntactic complexity in written texts. Furthermore, Perez (2013) compared asynchronous and synchronous computer-mediated communication for their effect on language productivity. In that study, Perez measured language productivity through new words used and found no significant difference between the two media. The preference of one medium over the other was also similar between the two groups.

However, it should be noted that students produced more words in chat than in email messages.

Chapter 3
Methodology

3.1 Introduction

This chapter provides an outline of the design of the study and elaborates on the recruitment of the participants, instruments utilized, and the procedures taken in this study. Finally, the details of the steps of data collection and further analysis of the collected data will also be provided.

3.2 Research Design

To answer the research questions, the researcher adopted both quantitative and qualitative method designs as it has been suggested that qualitative analysis can be a complement to the quantitative phase of a study as it investigates the topic in more details and provides a better understanding of the phenomenon studied (Seliger & Shohamy, 2013). Thus, to compare the performance of the students who received online communication practice and the performance of those who did not receive any treatment, the researcher compared the performance of the two groups quantitatively. Moreover, the perceptions of the participants were further explored through a questionnaire that has been validated as a "Community of Inquiry (CoI) survey instrument" (Damm, 2016, p. 140). This model has developed from constructivism and its supporters stress the inclusion of all the elements identified for a successful online learning experience (Damm, 2016).

With regard to the design of the study, it needs to be mentioned that this research study was of experimental type based on a pre-test and post-test design. The participants of the study were randomly assigned into one experimental and one control group. The study can be classified as a true experimental study since the process of random assignment was used (Shadish, Cook, & Campbell, 2002). According to Shadish et al. (2002), by

appropriately implementing randomized experiments, we can create groups that are like each other on average. As a result, any differences observed between those groups at the end of the study are likely to be due to the treatment introduced, not to differences already existing between the groups prior to the treatment. In addition, the purpose of the inclusion of a control group in this study as well as pre-tests was to get a rather valid estimate of the online computer-mediated communication and its effect on syntactic complexity in oral performance.

As far as variables are concerned, the study included both syntactic complexity and online CMC. The learners' ability to use syntactically complex structures was the dependent variable which was observed and measured. Figure 1 represents the variables of the study as well as the two groups of participants taking part in this research. First the groups' initial ability was checked through the use of a pre-test interview. The data from the pre-test served as a baseline measure for the learners' oral performance at the beginning of the study, prior to any treatment. Then, the treatment followed, and any probable changes in syntactic complexity were measured through a post-test interview.

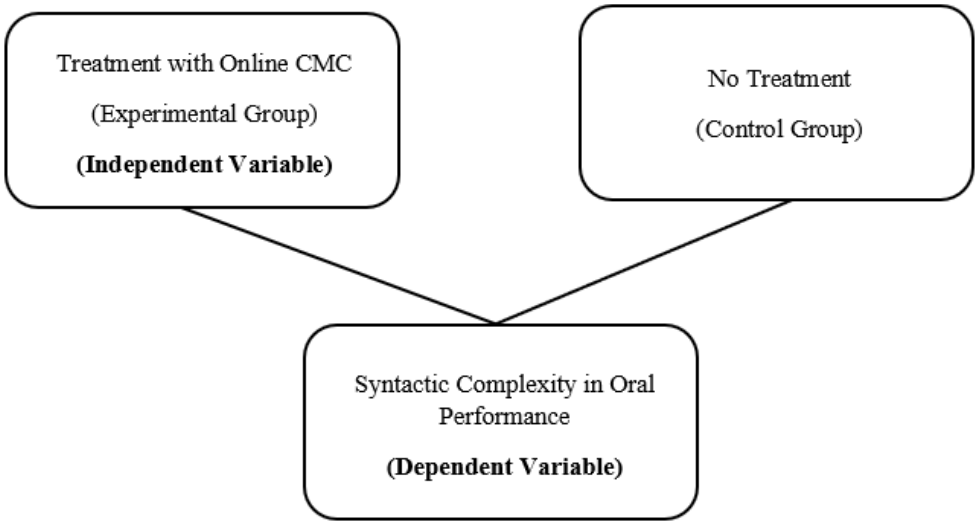

Figure 1 *Variables of the Study*

3.3 Participants

In this research, initially 35 participants were recruited from among the adult intermediate students at a language school in Tehran, Iran. The recruitment process began with posters put up at the language school explaining the details of the research including the purpose and invited volunteer participants to join. It also included the offer of a gift card with the balance of ten Canadian dollars which could pay for Internet data needed to take part in this study. Throughout this study, five participants withdrew from the study due to their inability in attending either the oral discussions on WhatsApp Messenger or the post-test interviews at the end of the study. The remaining 30 male EFL learners had the mean age of 25.7. The age range of the recruitment for this study was between 19 and 33. As indicated by Table 4 below, the age of 24.4% of the participants was 19, 48.9% were in their twenties and 26.7% were between 30 to 33 years of age.

Table 1

Age Frequency

Items	F	Percentage of F	Mean
19 years of age	6	24.4%	25.7
20-29 years of age	17	48.9%	
30-33 years of age	7	26.7%	
Total	30	100%	

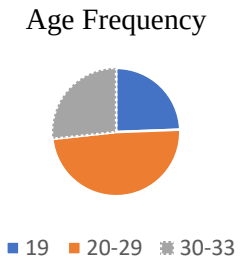

Figure 2 *Age Frequency of the Participants*

The participants of the study are not referred to by name throughout the research for the purpose of retaining their anonymity. The participants were all studying English at

Iran Language Institute in Tehran at the time of recruitment. The participants in the experimental group were asked to take part in online discussion tasks on WhatsApp Messenger. In total, the participants took part in eight tasks i.e., one task a week for a period of two months.

Furthermore, the reason for selecting intermediate EFL learners as participants in this study was the assumption that since they were of higher language proficiency, they had already acquired basic working knowledge of English morphology, syntax and discourse structures. The intermediate learners in this sense are those who can produce simple connected discourse in the form of oral comments on topics which are familiar or of personal interest. These learners can describe experiences and events and give reasons and explanations for opinions and plans. Moreover, another important criterion for the recruitment of the participants of the study was their having Internet access out of the class sessions.

These students had completed three years of English at that institution or the equivalent. The regular class meeting times were the same for both groups; each met two times every week for one hour and 45 minutes at the language institute. In addition, all participants in the experimental group had general computer skills and were familiar with WhatsApp Messenger application. Without exception, they had used this messaging tool extensively. Moreover, only the data for those students who gave permission to use their data and also participated in every oral discussion were used.

One instructor and an interviewer were also involved in the study as well as the main researcher. The instructor was a bilingual speaker of Farsi and English who taught all intermediate level classes of the language institute. He was an applied linguistics MA

graduate with seven years of experience in teaching English previously. He did not participate in either the online oral discussions or the interview sessions. The interviewer was also an MA holder active in the field of applied linguistics with seven years of teaching and research experience.

3.4 Pilot Study

Before collecting the required data concerning the present study, a one-week pilot study took place prior to the actual experimentation. This allowed the researcher to pretest the use of WhatsApp for discussion purposes and to identify and address any unforeseen problems as well as to test the time allocation and procedures for the future data collection regarding the participants. The pilot study consisted of three adult learners. The researcher attempted to simulate the exact situation favorable for the study. Prior to the first administration, the researcher provided the participants with enough explanation as to how they should post audio messages in WhatsApp Messenger.

One useful feature of WhatsApp for our study which was identified by one of the participants during the piloting was the feature that allows participants to choose to respond to specific comments of other language learners in the WhatsApp group. Also, due dates and time frames for the completion of tasks were discussed during the pilot study with the participants. Also, an approximate amount of time needed to complete the tasks and the survey questionnaires was decided at this stage.

In conclusion, the pilot study gave the researcher an invaluable insight into the required procedures and effective ways to conduct data collection in a convenient way for both the researcher and the participants.

3.5 Instrumentation

For the purpose of data collection, three instruments were used in this study.

The first one was the speaking sections of two different retired IELTS tests, which are globally recognized, to measure the participants' oral performance both prior to and following the treatment. IELTS tests are considered as standardized tests and have earned a high reputation as valid and reliable instruments for assessing English language proficiency for English as a second and foreign language. The International English Language Testing System (IELTS) is an international test of English language proficiency for non-native English language speakers. IELTS measures the ability to listen, read, write and speak in English. The speaking section of the IELTS is a key component of this proficiency test. It is conducted in one-to-one interviews with an examiner. The test taker is assessed as he or she is speaking. In addition, IELTS tests are piloted on large samples of students of different language backgrounds in intensive, college-level and high school programs (Appendix A and B). In the current study, only the speaking section of the test was administered. The examiners in interviews adhere to strictly controlled structures when asking questions for the purpose of consistency. This test contains three sections. The first section is devoted to introduction and interview which takes about five minutes. Examiners often ask personal questions regarding their home, family, work and interests. In the second section of the IELTS, which takes about three or four minutes, examiners give a task card to test takers about a topic. Then, test takers have a minute to think about the topic. The card tells the test taker about what to include in their talk. After preparing for one minute, examiner will ask the test takers to talk about the topic for two minutes. The final section of the interview takes about five minutes. This section is a discussion between the examiner and the test taker related to the questions posed in section two (O'sullivan, 2018).

Regarding the tasks used in this study, it should be noted that following the pre-test, the learners in the experimental group were required to take part in online computer-mediated speaking tasks, which lasted for eight weeks. The speaking tasks were adopted from the book Discussion A-Z, which is a resource book published by Cambridge University which includes speaking tasks. These speaking task sessions were held on WhatsApp Messenger. The subjects discussed different topics each week. The topics assigned each week for the online speaking task matched the themes covered in the textbook used for intermediate EFL learners of the language school. Like most instant messaging applications, WhatsApp Messenger allows the users to create a group so that as many as two hundred and fifty-six people can join and send text, video and audio messages all at once. Upon creating a group on WhatsApp, only the participants in the experimental group were added up to the group. From there, learners could leave voice messages on WhatsApp Messenger. Theses voice messages were participants' discussion of topics assigned by their researcher beforehand based on the speaking tasks adopted from the book Discussion A-Z (Appendix C).

The following figure shows the group which the researcher created, and the participants later joined to do the discussion tasks they were assigned each week. Participants' voice messages can be listened to as many times as needed as soon as the messages are sent to the group by all members of the group including the creator. Participants can also delete their own messages once they post them to the group.

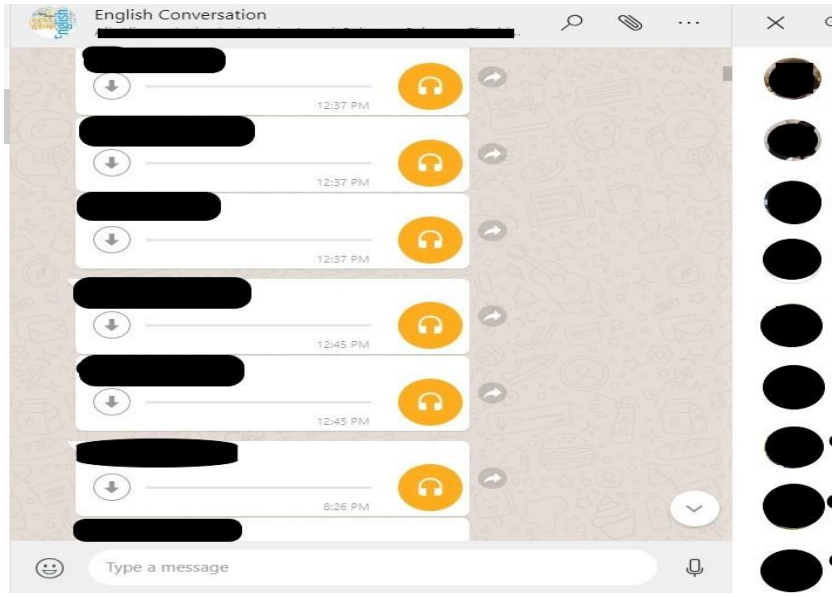

Figure 3 *WhatsApp Messenger Chat Group*

The third instrument was a questionnaire that was conducted to investigate the participants' perception of the effectiveness of the online CMC practice they received (Appendix D). The questionnaire was adopted from the study carried out by Salloum (2011) and elicited information on five main categories of teaching, social and cognitive presence as well as CMC tool helpfulness and respondents' comfort level. The learners were required to respond to this Likert-type scale survey questionnaire. The instrument consisted of a series of statements and participants were asked to indicate whether they strongly agreed, agreed, were undecided (neutral), disagreed, or strongly disagreed with those statements.

It should be mentioned that all participants attended their regular classes during the two months of the experiment, and they used their regular course books in class which are developed by Iran Language Institute (The ILI English Series. Intermediate. Planned, compiled, and revised by Research and Planning Department, 2004, Tehran: Iran Language Institute). Each session of classes lasts for an hour and 45 minutes. Classes are held twice

a week. Meanwhile, the treatment group additionally participated in week-long sessions (eight in total) of CMC using WhatsApp messaging application for interaction. Table 1 shows the differences in treatment between the control and the experimental group.

Table 2

Number of Participants in the Control and Treatment Group

Group	Treatment	Participants
Control	No CMC; students completed regular class activities based on textbook.	N=15
Experimental	Students took part in eight one-week long online CMC sessions as well as completing regular class activities based on textbook	N=15

3.6 Procedures

Following the pilot study, participants were randomly assigned into two groups. Then, the pre-test was administered using the IELTS tests which entailed oral sessions where participants from both groups were interviewed. Later, theses audio-recorded interviews were transcribed by the researcher for further analysis. The audiotaping was done by an interviewer in order to eliminate possible interference effects from the instructor's or researcher's presence during the discussions as he was never present during regular instruction. The data collection resulted in approximately four hours of audiotaped conversations. Linguistic features of learners' speech were the focus of the pre-test and the post-test. The following table presents the different stages of data collection procedures in the study in the order as they occurred.

Table 3

Data Collection Procedures

1.	Pilot Study
2.	Pre-test interview with all participants (Control and Experimental Group) using IELTS test

3. Control group received no treatment.	The experimental group received online computer-mediated speaking task as treatment.
4. Post-Test Interview with All Participants (Control and Experimental Group) using IELTS tests	
5. Survey with participants in the experimental group regarding their perceptions of online computer-mediated speaking.	

3.7 Data Analysis

With regard to oral proficiency, which is the dependent variable of the study, a point which is worth discussing is the characteristics of speakers who are regarded as proficient. According to the existing literature, these characteristics are often a point of contention, and it is not always clear what speaking proficiency comprises; the term may be used differently from researcher to researcher (McNamara, 1996). Literature in both language assessment and second language acquisition has extensively investigated characteristics of oral proficiency. Some studies such as Higgs and Clifford's (1982) have explored proficiency based on scores awarded from rating scales and feedback on ratings collected from teachers and researchers adopting qualitative approach, while others such as Magnan (1988) and Larsen-Freeman (2006) have conducted in-depth analyses of learner performance through objective assessment. Along similar lines, Higgs and Clifford (1982) have proposed that different factors make up overall language proficiency across different levels. They further described the relative role of each of five component factors contributing to general language proficiency namely vocabulary, grammar, pronunciation, fluency and sociolinguistics. However, oral performance in this study was operationalized as the syntactic complexity of Iranian EFL learners' production on the speaking test of the IELTS.

Following the collection of data, the recorded data were analyzed according to gains in scores between the first and the second or final oral interview sessions, which were respectively, pre-test and post-test scores. The second round of interviews were conducted after a two-month interval of online CMC treatment. The treatment sessions lasted for about somewhere between 45 to 65 minutes per session. For the purpose of this study, the means and standard deviations for the 14 indicators of syntactic complexity were obtained for the control and the experimental groups. Following that, the differences between the two groups, which demonstrated the degree of learning that was achieved through online CMC was compared. As mentioned earlier, data collected from language learners were analyzed in terms of syntactic complexity in oral performance.

Previous researchers have defined syntactic complexity as the level of language variety and also how sophisticated the language and the structures produced by learners are (Foster & Skehan 1996, Ortega 2003, Wolfe-Quintero et al. 1998). Syntactic complexity has been considered an important indicator of language proficiency in second language teaching and research. Consequently, developing syntactic complexity should be a indispensable part to be included in language syllabai (Lu and Ai, 2015).

Syntactic complexity in this research was calculated by a web-based interface called L2 Syntactic Complexity Analyzer, which allows automatic analysis of 14 different measures of syntactic complexity, covering (1) length of production units, (2) amounts of coordination, (3) amounts of subordination, (4) overall sentence complexity and (5) particular structures, which are all defined in Table 4 (Lu and Ai, 2015). This computational system for automatic analysis of syntactic complexity in second language uses 14 different measures that have been investigated or proposed in previous studies of

second language development. The system takes a language sample as input and produces 14 indices of syntactic complexity of the transcribed or written sample taken based on these measures. Experimental results have shown that the system establishes very high reliability on data from the corpus (Lu and Ai, 2015; Lu, 2010; Polio & Yoon, 2018; Polat, Mahalingappa & Mancilla, 2019).

The following table taken from Lu's (2010, p. 6) summarizes the definitions of the 14 syntactic complexity indicators selected.

Table 4

Measures and Definitions of Syntactic Complexity

Measure	Definitions	Code
Type 1: Length of Production Unit		
Mean length of clause	# of words/# of clauses	MLC
Mean length of sentence	# of words/# of sentences	MLS
Mean length of T-unit	# of words/# of T-units	MLT
Type 2: Sentence Complexity		
Sentence Complexity Ratio	# of clauses / # of sentences	C/S
Type 3: Amount of Subordination		
T-unit complexity ratio	# of clauses/# of T-unit	C/T
Complex T-unit ratio	# of complex T-units/# of T-units	CT/T
Dependent clause ratio	# of dependent clauses/# of clauses	DC/C
Dependent clauses per T-unit	# of dependent clauses/# of T-units	DC/T
Type 4: Amount of Coordination		
Coordinate phrases per clause	# of coordinate phrases/# of clauses	CP/C
Coordinate phrases per T-unit	# of coordinate phrases/# of T-units	CP/T
Sentence coordination ratio	# of T-units/# of sentences	T/S
Type 5: Particular Structures		
Complex nominals per clause	# of complex nominals / # of clauses	CN/C
Complex nominals per T-unit	# of complex nominals / # of T-units	CN/T

Verb phrases per T-units	# of verb phrases / # of T-units	VP/T

This analyzer allows users to measure syntactic complexity of transcribed or written English samples to a maximum of 30 files at a time. After submitting the files, the results will be produced in a spreadsheet file which can be input into statistical software for further statistical analysis. The following figure shows the output produced by this web-based analyzer in a spreadsheet file. The use of this analyzer is free. However, teachers and researchers are required to register and create an account before using it.

	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
	MLS	MLT	MLC	C/S	VP/T	C/T	DC/C	DC/T	T/S	CT/T	CP/T	CP/C	CN/T	CN/C
29	18.75	13.6364	7.3171	2.5625	2.3182	1.8636	0.439	0.8182	1.375	0.5455	0.4545	0.2439	1.3182	0.7073
46	15.8	13.6207	8.0612	1.96	1.8621	1.6897	0.3061	0.5172	1.16	0.4138	0.4138	0.2449	1.5862	0.9388
39	16.6154	10.0465	8.4706	1.9615	1.3488	1.186	0.1569	0.186	1.6538	0.1163	0.3023	0.2549	0.907	0.7647
36	15.7727	13.3462	7.5435	2.0909	2.0385	1.7692	0.413	0.7308	1.1818	0.4615	0.3462	0.1957	1.3846	0.7826
34	11.0882	10.4722	7.8542	1.4118	1.6111	1.3333	0.2083	0.2778	1.0588	0.1944	0.4167	0.3125	0.9444	0.7083
35	12.5556	9.9706	7.2128	1.7407	1.6176	1.3824	0.2766	0.3824	1.2593	0.3824	0.2059	0.1489	1.0294	0.7447
41	13.069	11.4848	9.7179	1.3448	1.4848	1.1818	0.1538	0.1818	1.1379	0.1818	0.2424	0.2051	1.2424	1.0513
37	15.1818	12.3704	8.35	1.8182	1.8519	1.4815	0.35	0.5185	1.2273	0.5185	0.1852	0.125	1.3704	0.925
38	17.6957	15.6538	9.25	1.913	2.1923	1.6923	0.3409	0.5769	1.1304	0.3846	0.4615	0.2727	1.4615	0.8636
39	14.3462	12.4333	8.881	1.6154	1.7	1.4	0.2619	0.3667	1.1538	0.4333	0.4	0.2857	1.3	0.9286
37	12	10.6667	8.3478	1.4375	1.5278	1.2778	0.2174	0.2778	1.125	0.2222	0.3056	0.2391	1.0278	0.8043
21	12.6	10.5	8.129	1.55	1.5	1.2917	0.1935	0.25	1.2	0.25	0.375	0.2903	0.875	0.6774
39	16.0833	12.0625	8.2128	1.9583	1.75	1.4688	0.2979	0.4375	1.3333	0.3438	0.3125	0.2128	1.2188	0.8298
38	11.5714	10.3846	7.7885	1.4857	1.7179	1.3333	0.25	0.3333	1.1143	0.2308	0.4103	0.3077	0.9744	0.7308
29	15.6923	12.3636	8	1.9615	1.9091	1.5455	0.3333	0.5152	1.2692	0.2727	0.2727	0.1765	0.8788	0.5686

Figure 4 *The Web-based Syntactic Complexity Analyzer*

After the required data were collected by the researcher, statistical analysis of the data was carried out using the Statistical Package for the Social Sciences (SPSS) software version 22.00. Through the calculation of the mean scores of the experimental and control groups and comparing the differences using independent t-tests and Mann-Whitney *U* tests for each syntactic complexity indicator, any probable effect on syntactic complexity was calculated. Notably, the level of confidence for all statistical analyses in this study was .05. The following chapter will present the results of the statistical analysis and discuss the findings in the light of previous research.

Chapter 4
Results from Syntactic Complexity Analyzer

This chapter provides results collected from both the pre- and post-tests done by both the experimental and control groups on the 14 syntactic complexity measures. Also provided is the statistical analysis on the results using SPSS version 22.00.

4.1 Overall Results

Table 5 shows all the means obtained by the participants in both the control and the experimental groups on pre- and post-tests.

Table 5

Means of the 14 Syntactic Complexity Indicators in Pre- and Post-Tests for Both Groups

Syntactic Measures / Groups & Tests	MLS	MLT	MLC	C/S	VP/T	C/T	DC/C	DC/T	T/S	CT/T	CP/T	CP/C	CN/T	CN/C
Experimental Pre-Test	21.21	16.87	7.29	2.93	2.85	2.33	0.45	1.08	1.25	0.59	0.60	0.25	1.45	0.62
Experimental Post-Test	30.26	18.65	6.39	4.75	3.21	2.92	0.46	1.42	1.68	0.71	0.57	0.19	1.66	0.55
Control Pre-Test	26.95	20.89	8.69	3.19	2.98	2.42	0.43	1.12	1.30	0.60	0.67	0.28	1.48	0.61
Control Post-Test	14.58	11.93	8.20	1.78	1.76	1.45	0.28	0.42	1.22	0.32	0.34	0.23	1.16	0.80

The following sections will examine these means in further details.

4.2 Results of the Control Group's Pre-test

In order to be able to compare the differences between the two groups, it was first important to check the normality of data as one of the assumptions of parametric tests. Since we have only 15 participants, the Shapiro-Wilk test was used to check the normality of data. The standard procedure of checking normal distribution is that the Shapiro-Wilk test compares the scores in the samples of the study to a normally distributed set of scores that has the same mean and standard deviation. As a result, the null hypothesis in this case is that the

test scores are not statistically significantly different from the normal distribution (Ghasemi & Zahediasl, 2012). As indicated in Table 6, for mean length of clause the p-value is .003, for mean length of sentence, p = .483, for mean length of T-Unit, p = .330, for sentence complexity ratio, p = .696, for T-Unit complexity ratio, p = .525, for complex T-Unit ratio, p = .021, for dependent clause ratio, p = .553, for dependent clauses per T-Unit, p = .871, for coordinate phrases per clause, p = .341, for coordinate phrases per T-unit, p = .249, for sentence coordination ratio, p = .182, for complex nominals per clause, p = .542, for complex nominals per T-unit, p = .099 and for verb phrases per T-Units, p = .698, and it can be concluded that the data comes from a normal distribution and the assumption of normality of data was met for all indicators except for mean length of clause (MLC) and complex T-unit ratio (CT/T) whose p value is less than 0.05.

Table 6

Tests of Normality: Control Group Pre-tests

	Shapiro-Wilk		
	Statistic	df	Sig.
Mean Length of Sentence (MLS)	.947	15	.483
Mean Length of T-units (MLT)	.936	15	.330
Mean Length of Clause (MLC)	.796	15	.003
Sentence Complexity Ratio (C/S)	.960	15	.696
Verb phrases per T-units (VP/T)	.960	15	.698
T-unit Complexity Ratio (C/T)	.950	15	.525
Dependent Clause Ratio (DC/C)	.952	15	.553
Dependent Clause per T-unit (DC/T)	.971	15	.871
Sentence coordination ratio (T/S)	.918	15	.182
Complex T-unit Ratio (CT/T)	.856	15	.021
Coordinate phrases per T-unit (CP/T)	.927	15	.249
Coordinate Phrases per Clauses (CP/C)	.937	15	.341

Complex nominals per clause (CN/C)	.951	15	.542
Complex nominals per T-unit (CN/T)	.901	15	.099

Figure 5 also shows a graphical representation of the mean of the control group on pre-tests.

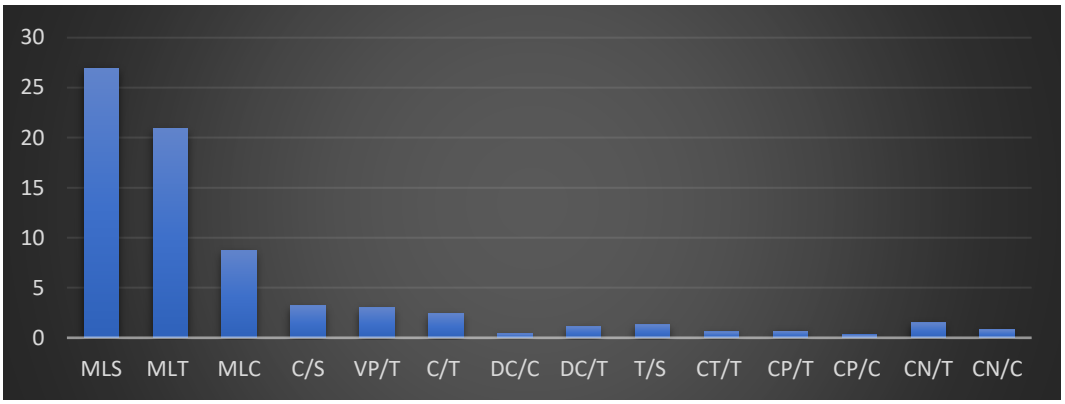

Figure 5 *Means of 14 Syntactic Complexity Indicators in Control Group (Pre-test)*

As can be seen in Figure 5, for mean length of sentence (MLS), the mean is 26.95, for mean length of T-units (MLT), it is 20.89, For mean length of clause (MLC), *M* = 8.69, for sentence complexity ratio (C/S), *M* = 3.19, for verb phrases per T-units (VP/T), *M* = 2.98, for T-unit complexity ratio (C/T), *M* = 2.42, for dependent clause ratio (DC/C), *M* = 0.43, for dependent clause per T-unit (DC/T), *M* = 1.12, for sentence coordination ratio (T/S), *M* = 1.30, for complex T-unit ratio (CT/T), *M* = 0.60, for coordinate phrases per T-unit (CP/T), *M* = 0.67, for coordinate phrases per clauses (CP/C), *M* = 0.28, for complex nominals per T-Unit (CN/T), *M* = 1.48, and for complex nominals per clause (CN/C), *M* = 0.61.

With regard to the indices displayed by the figures in this chapter, as stated earlier in chapter three, mean length of clause measures the number of words divided by the number of clauses, mean length of sentence is measured by dividing the number of words by the number of sentences and mean length of T-unit is the division of the number of

words by the number of T-units. This analyzer calculates sentence complexity ratio by dividing the number of clauses by the number of sentences. T-unit complexity ratio is calculated by dividing the number of clauses by the number of T-units. Complex T-unit ratio shows the number of complex T-units divided by the number of T-units. Dependent clause ratio divides number of dependent clauses by the number of all clauses. Dependent clauses per T-unit is an indicator of syntactic complexity that divides the number of dependent clauses by the number of T-units. Furthermore, coordinate phrases per clause is another indicator that is calculated by dividing the number of coordinate phrases by the number of all clauses. Coordinate phrases per T-unit is the calculation of dividing the number coordinate phrases by the number of T-units. Sentence coordination ratio shows the number of T-units divided by the number of sentences. Complex nominals per clause is measured by dividing the number of complex nominals by the number of all clauses. Complex nominals per T-unit divides the number of complex nominals by the number of T-units. Lastly, verb phrases per T-units divides the number of verb phrases by the number of T-units.

4.3 Results of the Control Group's Post-test

As can be seen in Table 7, the Shapiro-Wilk test used to check the normality of data shows that for mean length of clause the p-value is .593, for mean length of sentence, $p = .534$, for mean length of T-unit, $p = .183$, for sentence complexity ratio, $p = .226$, for T-unit complexity ratio, $p = .348$, for complex T-unit ratio, $p = .692$, for dependent clause ratio, $p = .826$, for dependent clauses per T-unit, $p = .390$, for coordinate phrases per clause, $p = .709$, for coordinate phrases per T-unit, $p = .459$, for sentence coordination ratio, $p = .007$, for complex nominals per clause, $p = .959$, for complex nominals per T-unit, $p = .210$ and

for verb phrases per T-units, p = .721, and since the significance level for all indicators except sentence coordination ratio (T/S) is greater than .05, it can be assumed that the data comes from a normal distribution for all indicators of syntactic complexity but not for sentence coordination ratio.

Table 7

Tests of Normality: Control Group Post-tests

	Shapiro-Wilk		
	Statistic	df	Sig.
Mean Length of Sentence (MLS)	.951	15	.534
Mean Length of T-Units (MLT)	.919	15	.183
Mean Length of Clause (MLC)	.954	15	.593
Sentence Complexity Ratio (C/S)	.925	15	.226
Verb phrases per T-units (VP/T)	.962	15	.721
T-unit Complexity Ratio (C/T)	.937	15	.348
Dependent Clause Ratio (DC/C)	.968	15	.826
Dependent Clause per T-unit (DC/T)	.941	15	.390
Sentence coordination ratio (T/S)	.819	15	.007
Complex T-unit Ratio (CT/T)	.960	15	.692
Coordinate phrases per T-unit (CP/T)	.946	15	.459
Coordinate Phrases per Clauses (CP/C)	.961	15	.709
Complex nominals per clause (CN/C)	.979	15	.959
Complex nominals per T-unit (CN/T)	.923	15	.210

As can be seen in Figure 4, for mean length of sentence (MLS), the mean is 14.58, for mean length of t-units (MLT), it is 11.93, For mean length of clause (MLC), M = 8.20, for sentence complexity ratio (C/S), M = 1.78, for verb phrases per t-units (VP/T), M = 1.76, for t-unit complexity ratio (C/T), M = 1.45, for dependent clause ratio (DC/C), M = 0.28, for dependent clause per t-unit (DC/T), M = 0.42, for sentence coordination ratio (T/S), M = 1.22, for complex t-unit ratio (CT/T), M = 0.32, for coordinate phrases per t-unit (CP/T), M = 0.34, for coordinate phrases per clauses (CP/C), M = 0.23, for complex

nominals per t-unit (CN/T), *M* = 1.16, and for complex nominals per clause (CN/C), *M* = 0.80.

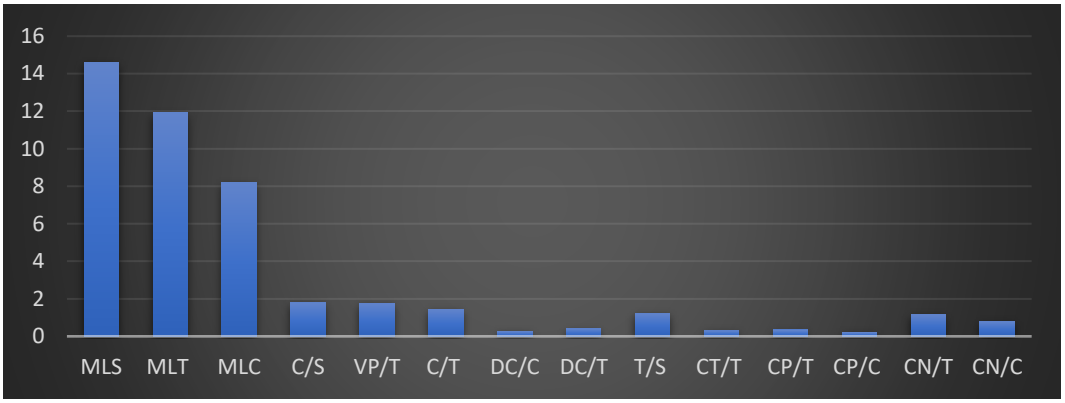

Figure 6 *Means of 14 Syntactic Complexity Indicators in Control Group (Post-test)*

4.4 Results of the Experimental Group's Pre-test

The test statistics for the control group's pre-test are shown in Table 6. As was discussed above, in our research we have only 15 participants in each group, which means we could use the Shapiro-Wilk test was to check the normality of data. For datasets which are larger than two-thousand elements, the Kolmogorov-Smirnov normality test can be used. In this dataset, the hypothesis is that the data is not normally distributed. From Table 6, for mean length of clause the p-value is .001, for mean length of sentence, it is .106, for mean length of T-unit, *p* = .239, for sentence complexity ratio, *p* = .416, for T-unit complexity ratio, *p* = .261, for complex T-unit ratio, *p* = .580, for dependent clause ratio, *p* = .854, for dependent clauses per T-unit, *p* = .354, for coordinate phrases per clause, *p* = .071, for coordinate phrases per T-unit, *p* = .002, for sentence coordination ratio, *p* = .089, for complex nominals per clause, *p* = .503, for complex nominals per T-unit, *p* = .028 and for verb phrases per T-units, *p* = .923, and since the significance level for all indicators is greater than .05, it can be assumed that the alternative hypothesis can be rejected and

conclude that the data comes from a normal distribution except for mean length of clause, coordinate phrases per T-unit and complex nominals per T-unit.

Table 8

Tests of Normality: Experimental Group Pretests

	Shapiro-Wilk		
	Statistic	df	Sig.
Mean Length of Sentence (MLS)	.903	15	.106
Mean Length of T-units (MLT)	.926	15	.239
Mean Length of Clause (MLC)	.749	15	.001
Sentence Complexity Ratio (C/S)	.943	15	.416
Verb phrases per T-units (VP/T)	.975	15	.923
T-unit Complexity Ratio (C/T)	.929	15	.261
Dependent Clause Ratio (DC/C)	.970	15	.854
Dependent Clause per T-unit (DC/T)	.938	15	.354
Sentence coordination ratio (T/S)	.898	15	.089
Complex T-unit Ratio (CT/T)	.953	15	.580
Coordinate phrases per T-unit (CP/T)	.777	15	.002
Coordinate Phrases per Clauses (CP/C)	.892	15	.071
Complex nominals per clause (CN/C)	.949	15	.503
Complex nominals per T-unit (CN/T)	.864	15	.028

Figure 3 shows a graphical representation of the mean of the experimental group in pre-test. For mean length of sentence (MLS), the mean is 21.21, for mean length of t-units (MLT), it is 16.87, For mean length of clause (MLC), $M = 7.29$, for sentence complexity ratio (C/S), $M = 2.93$, for verb phrases per t-units (VP/T), $M = 2.85$, for t-unit complexity ratio (C/T), $M = 2.33$, for dependent clause ratio (DC/C), $M = 0.45$, for dependent clause per t-unit (DC/T), $M = 1.08$, for sentence coordination ratio (T/S), $M = 1.25$, for complex t-unit ratio (CT/T), $M = 0.59$, for coordinate phrases per t-unit (CP/T), $M = 0.60$, for

coordinate phrases per clauses (CP/C), *M* = 0.25, for complex nominals per t-unit (CN/T), *M* = 1.45, and for complex nominals per clause (CN/C), *M* = 0.62.

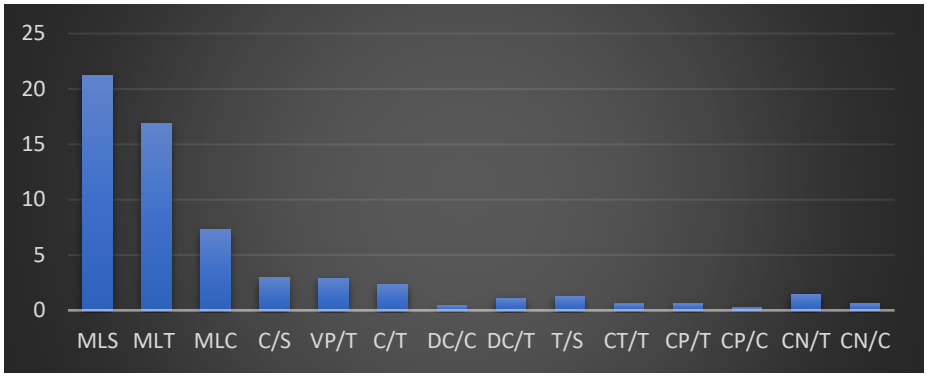

Figure 7 *Means of 14 Syntactic Complexity Indicators in Experimental Group (Pre-test)*

4.5 Results of the Experimental Group's Post-test

As Table 9 shows the results for the Shapiro-Wilk test of data normality. For mean length of clause the p-value is .182, for mean length of sentence, it is .626, for mean length of t-unit, *p* = .284, for sentence complexity ratio, *p* = .444, for t-unit complexity ratio, *p* = .169, for complex t-unit ratio, *p* = .411, for dependent clause ratio, , *p* = .779, for dependent clauses per t-unit, *p* = .127, for coordinate phrases per clause, *p* = .093, for coordinate phrases per t-unit, *p* = .515, for sentence coordination ratio, *p* = .048, for complex nominals per clause, *p* = .194, for complex nominals per t-unit, *p* = .183 and for verb phrases per t-units, *p* = .032. The significance level for all indicators except for verb phrases per t-units (VP/T) and sentence coordination ratio (T/S) is greater than .05, it can be assumed that the assumption of normality of data was met for all indicators except these two measures.

Table 9
Tests of Normality: Experimental Group Post-tests

	Shapiro-Wilk		
	Statistic	df	Sig.
Mean Length of Sentence (MLS)	.956	15	.626
Mean Length of T-units (MLT)	.931	15	.284
Mean Length of Clause (MLC)	.918	15	.182

Sentence Complexity Ratio (C/S)	.945	15	.444
Verb phrases per T-units (VP/T)	.868	15	.032
T-unit Complexity Ratio (C/T)	.916	15	.169
Dependent Clause Ratio (DC/C)	.965	15	.779
Dependent Clause per T-unit (DC/T)	.908	15	.127
Sentence coordination ratio (T/S)	.881	15	.048
Complex T-unit Ratio (CT/T)	.942	15	.411
Coordinate phrases per T-unit (CP/T)	.949	15	.515
Coordinate Phrases per Clauses (CP/C)	.899	15	.093
Complex nominals per clause (CN/C)	.920	15	.194
Complex nominals per T-unit (CN/T)	.918	15	.183

As indicated by Figure 6, for mean length of sentence (MLS), the mean is 30.26, for mean length of t-units (MLT), it is 18.65, For mean length of clause (MLC), M = 6.39, for sentence complexity ratio (C/S), M = 4.75, for verb phrases per t-units (VP/T), M = 3.21, for t-unit complexity ratio (C/T), M = 2.92, for dependent clause ratio (DC/C), M = 0.46, for dependent clause per t-unit (DC/T), M = 1.42, for sentence coordination ratio (T/S), M = 1.68, for complex t-unit ratio (CT/T), M = 0.71, for coordinate phrases per t-unit (CP/T), M = 0.57, for coordinate phrases per clauses (CP/C), M = 0.19, for complex nominals per t-unit (CN/T), M = 1.66, and for complex nominals per clause (CN/C), M = 0.55.

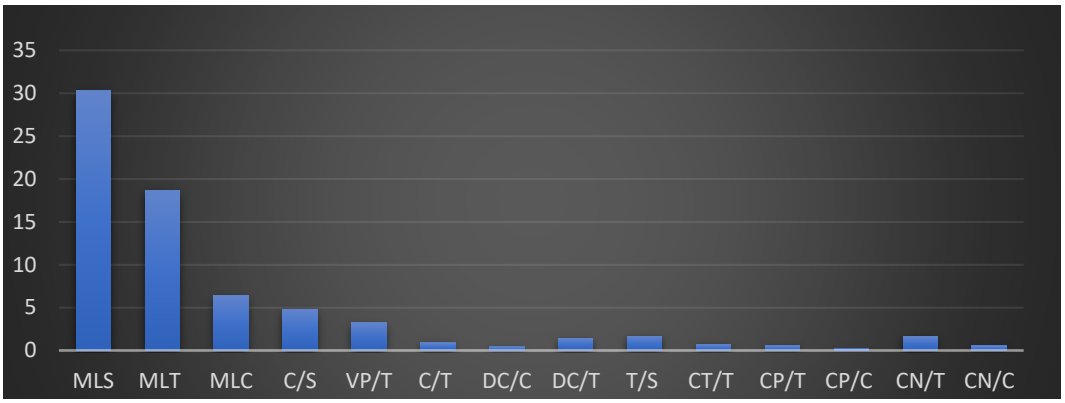

Figure 8 *Means of 14 Syntactic Complexity Indicators in Experimental Group (Post-test)*

4.6 Comparison of the Control Group on Pre- and Post-Tests

This section compares the mean scores obtained by the participants in the control group to check if there was any probable improvement in terms of syntactic complexity over the course of this study. As the results of the Shapiro-Wilk test of normality revealed, the dataset for all indicators was normally distributed except for mean length of clause (MLC) and complex T-unit ratio (CT/T) on the pre-test and sentence coordination ratio (T/S) on the post-test. In order to compare the differences paired samples t-tests were run to know if participants' scores improved from before the beginning of this study to the end for the indicators with normally distributed data. Paired Samples t-tests are run to compare two sets of scores (i.e., before and after the treatment) for the same group of participants. However, for indicators whose dataset violates this assumption of paired samples t-test, the Wilcoxon signed-rank test, which is a non-parametric statistical hypothesis test, is used to compare the differences in the ranks of two related groups (Gay, Mills, & Airasian, 2009). The descriptive statistics i.e., the mean, the sample size, the standard deviation and the standard error of the mean scores for each variable is displayed in Table 10.

Table 10

Control Group T-test Descriptive Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Mean Length of Sentence Pretest	26.9513	15	11.09900	2.86575
Mean Length of Sentence Post-test	14.5881	15	2.33400	.60264
Mean Length of T-units Pretest	20.8926	15	8.84481	2.28372
Mean Length of T-units Post-test	11.9342	15	1.64826	.42558
Sentence Complexity Ratio Pretest	3.1921	15	1.07643	.27793
Sentence Complexity Ratio Post-test	1.7875	15	.32379	.08360
T-unit Complexity Ratio Pretest	2.4267	15	.65131	.16817
T-unit Complexity Ratio Post-test	1.4598	15	.21193	.05472
Dependent Clause Ratio Pretest	.4367	15	.14264	.03683
Dependent Clause Ratio Post-test	.2799	15	.08631	.02228
Dependent Clause per T-unit Pretest	1.1197	15	.55413	.14308
Dependent Clause per T-unit Post-test	.4247	15	.18909	.04882
Coordinate Phrases per Clauses Pretest	.2820	15	.10736	.02772
Coordinate Phrases per Clauses Post-test	.2344	15	.05656	.01460
Coordinate phrases per T-unit Pretest	.6713	15	.31215	.08060
Coordinate phrases per T-unit Post-test	.3403	15	.08798	.02272
Complex nominals per clause Pretest	.6146	15	.12578	.03248
Complex nominals per clause Post-test	.8017	15	.12377	.03196
Complex nominals per T-unit Pretest	1.4818	15	.50825	.13123
Complex nominals per T-unit Post-test	1.1679	15	.23314	.06020
Verb phrases per T-units Pretest	2.9804	15	.92676	.23929
Verb phrases per T-units Post-test	1.7620	15	.27142	.07008

As displayed in Table 11, the paired samples t-test results revealed that participants in the control group showed significant difference in mean length of sentence $t(14) = 4.208$, $p \leq .05$, mean length of t-unit, $t(14) = 3.699$, $p \leq .05$, sentence complexity ratio, $t(14) = 4.680$, $p \leq .05$, t-unit complexity ratio, $t(14) = 5.029$, $p \leq .05$, dependent clause ratio, $t(14) = 3.441$, $p \leq .05$, dependent clauses per t-unit, $t(14) = 4.210$, $p \leq .05$, coordinate phrases per t-unit, $t(14) = 3.608$, $p \leq .05$, complex nominals per clause, $t(14) = -4.389$, $p \leq .05$ and verb phrases per t-units $t(14) = 4.327$, $p \leq .05$. However, there was no significant difference

from the pre-test to the post-test on coordinate phrases per clause, $t(14) = 1.551$, $p \geq .05$, and complex nominals per t-unit, $t(14) = 1.944$, $p \geq .05$.

Table 11

Control Group Paired Samples T-test on Pre- and Post-test Results

	Paired Differences							
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Mean Length of Sentence Pretest - Post-test	12.36324	11.37882	2.93800	6.06186	18.66462	4.208	14	.001
Mean Length of T-units Pretest - Post-test	8.95842	9.37998	2.42190	3.76396	14.15288	3.699	14	.002
Sentence Complexity Ratio Pretest - Post-test	1.40463	1.16232	.30011	.76096	2.04830	4.680	14	.000
T-unit Complexity Ratio Pretest - Post-test	.96695	.74473	.19229	.55453	1.37937	5.029	14	.000
Dependent Clause Ratio Pretest - Post-test	.15679	.17648	.04557	.05906	.25452	3.441	14	.004
Dependent Clause per T-unit Pretest - Post-test	.69507	.63937	.16508	.34100	1.04914	4.210	14	.001
Coordinate Phrases per Clauses Pretest - Post-test	.04765	.11899	.03072	-.01824	.11355	1.551	14	.143
Coordinate phrases per T-unit Pretest - Post-test	.33103	.35536	.09175	.13423	.52782	3.608	14	.003
Complex nominals per clause Pretest - Post-test	-.18707	.16509	.04263	-.27850	-.09565	-4.389	14	.001
Complex nominals per T-unit Pretest - Post-test	.31391	.62546	.16149	-.03245	.66028	1.944	14	.072
Verb phrases per T-units Pretest - Post-test	1.21842	1.09053	.28157	.61451	1.82233	4.327	14	.001

It can be concluded from Table 11 that for all indicators there is a significant difference between the pre- and post-test of the participants in the control group except for coordinate phrases per clause and complex nominals per t-units. However, the participants improved on only one indicator from the pre-test to the post-test which was complex nominals per clause i.e., improvement in the experimental group in this indicator cannot

be attributed to the treatment in the study as the control group showed significant improvement in terms of complex nominals per clause.

Table 12 shows results from a Wilcoxon signed-rank test. This test was run to compare the differences in the remaining three indicators of mean length of clause (MLC), complex T-unit ratio (CT/T) and sentence coordination ratio (T/S), which were not normally distributed. As can be seen from Table 12, Wilcoxon Signed-Ranks Test results indicated that for mean length of clause (MLC), $Z = -.057$, $p < .955$, for complex T-unit ratio (CT/T), $Z = -.682$, $p < .496$ and for sentence coordination ratio (T/S), $Z = -3.124$, $p < .002$. The results revealed that despite the fact that the participants in the control group had significant difference in complex T-unit ratio (CT/T) on pre-test and post-test, they did not show any improvement from the pre-test to the post-test in any of these three indicators.

Table 12

Wilcoxon signed-rank Test Statistics

	Mean Length of Clause (MLC)	Sentence Coordination Ratio (T/S)	Complex T-Unit Ratio (CT/T)
Z	-.057	-.682	-3.124
Asymp. Sig. (2-tailed)	.955	.496	.002

4.7 Comparison of the Experimental Group on Pre- and Post-test

This section compares the mean scores obtained by the participants in the experimental group on their pre- and post-tests. As the results of the Shapiro-Wilk test of normality showed, the dataset for all indicators was normally distributed except for mean length of clause (MLC), coordinate phrases per T-unit (CP/T) and complex nominals per T-unit (CN/T) on the pre-test and verb phrases per T-units (VP/T) and sentence coordination ratio (T/S) on the post-test.

As was described in the previous section, paired samples t-tests are run to determine whether participants' scores improve from before the beginning of a study to the end for the indicators with normally distributed data. However, for indicators whose dataset violates this assumption, the Wilcoxon signed-rank test, which is a non-parametric statistical hypothesis test, is used. Following sections are results of tests run to find evidence of a significant difference.

Table 13

Experimental Group T-test Descriptive Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Mean Length of Sentence (MLS) Post-test	30.2644	15	6.16211	1.59105
	Mean Length of Sentence (MLS) Pre-test	21.2190	15	7.40904	1.91301
Pair 2	Mean Length of T-units (MLT) Post-test	18.6512	15	5.19754	1.34200
	Mean Length of T-units (MLT) Pre-test	16.8725	15	5.03699	1.30055
Pair 3	Sentence Complexity Ratio (C/S) Post-test	4.7533	15	.96575	.24935
	Sentence Complexity Ratio (C/S) Pre-test	2.9319	15	.86980	.22458
Pair 4	T-unit Complexity Ratio (C/T) Post-test	2.9236	15	.79734	.20587
	T-unit Complexity Ratio (C/T) Pre-test	2.3379	15	.60721	.15678
Pair 5	Dependent Clause Ratio (DC/C) Post-test	.4686	15	.09440	.02437
	Dependent Clause Ratio (DC/C) Pre-test	.4564	15	.10276	.02653
Pair 6	Dependent Clause per T-unit (DC/T) Post-test	1.4258	15	.63940	.16509
	Dependent Clause per T-unit (DC/T) Pre-test	1.0839	15	.41110	.10614
Pair 7	Complex T-unit Ratio (CT/T) Post-test	.7095	15	.12727	.03286

	Complex T-unit Ratio (CT/T) Pre-test	.5896	15	.14460	.03734
Pair 8	Coordinate Phrases per Clauses (CP/C) Post-test	.1944	15	.10359	.02675
	Coordinate Phrases per Clauses (CP/C) Pre-test	.2562	15	.12733	.03288
Pair 9	Complex nominals per clause (CN/C) Post-test	.5577	15	.09558	.02468
	Complex nominals per clause (CN/C) Pre-test	.6257	15	.15263	.03941

Table 13 shows the descriptive statistics i.e., the mean, the sample size, the standard deviation and the standard error of the mean scores for each variable.

Table 14

Experimental Group Paired Samples T-test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Mean Length of Sentence (MLS) Post-test – Pre-test	9.04548	10.72925	2.77028	3.10382	14.98714	3.265	14	.006
Mean Length of T-units (MLT) Post-test – Pre-test	1.77871	7.10564	1.83467	-2.15627	5.71368	.969	14	.349
Sentence Complexity Ratio (C/S) Post-test – Pre-test	1.82146	1.38886	.35860	1.05234	2.59058	5.079	14	.000
T-unit Complexity Ratio (C/T) Post-test – Pre-test	.58561	.92053	.23768	.07583	1.09538	2.464	14	.027
Dependent Clause Ratio (DC/C) Post-test - Pre-test	.01225	.15053	.03887	-.07111	.09561	.315	14	.757
Dependent Clause per T-unit (DC/T) Post-test – Pre-test	.34186	.71556	.18476	-.05440	.73812	1.850	14	.085
Complex T-unit Ratio (CT/T) Post-test – Pre-test	.11985	.17481	.04513	.02305	.21666	2.655	14	.019
Coordinate Phrases per Clauses (CP/C) Post-test – Pre-test	-.06181	.16538	.04270	-.15339	.02978	-1.447	14	.170
Complex nominals per clause (CN/C) Post-test – Pre-test	-.06799	.15222	.03930	-.15229	.01630	-1.730	14	.106

As can be seen in Table 14 , for mean length of sentence, t(14) = 3.265, $p \leq .05$, mean length of t-unit, t(14) = .969, $p \geq .05$, sentence complexity ratio, t(14) = 5.079, $p \leq .05$, t-unit complexity ratio, t(14) = 2.464, $p \leq .05$, dependent clause ratio, t(14) = .315, $p \geq .05$, dependent clauses per t-unit, t(14) = 1.850, $p \geq .05$, complex T-unit ratio, t(14) = 2.655, $p \leq .05$, coordinate phrases per clauses, t(14) = -1.447, $p \geq .05$ and complex nominals per clause t(14) = -1.730, $p \geq .05$. According to the paired samples t-test results, for all indicators there is a significant difference between the pre- and post-test of the participants in the experimental group except for mean length of T-units (MLT), dependent clause ratio (DC/C), dependent clause per T-unit (DC/T), coordinate phrases per clauses (CP/C) and complex nominals per clause (CN/C).

Table 15 shows results from a Wilcoxon signed-rank test. This test was run to compare the differences in the remaining five indicators of mean length of clause (MLC), sentence coordination ratio (T/S), verb phrases per T-units (VP/T), coordinate phrases per T-unit (CP/T) and complex nominals per T-unit (CN/T) whose data sets were not normally distributed for the experimental group. As can be seen from Table 15, Wilcoxon Signed-Ranks Test results indicated that for mean length of clause (MLC), Z = -1.988, p < .955, for verb phrases per T-units (VP/T), Z = -1.193, p < .496 and for sentence coordination ratio (T/S), Z = -3.408, p < .002, for coordinate phrases per T-unit, Z = -.031, p < .496 and for complex nominals per T-unit (CN/T), Z = -1.136, p < .496. The results revealed that the participants in this group had significant decrease in mean length of clause (MLC) and significant increase in sentence coordination ratio (T/S) comparing their pre- and post-tests results.

Table 15

Wilcoxon signed-rank Test Statistics

	Mean Length of Clause (MLC) Pre-test - Post-test	Verb phrases per T-units (VP/T) Pre-test - Post-test	Sentence coordination ratio (T/S) Pre-test - Post-test	Coordinate phrases per T-unit (CP/T) Pre-test - Post-test	Complex nominals per T-unit (CN/T) Pre-test - Post-test
Z	-1.988	-1.193	-3.408	-.031	-1.136
Asymp. Sig. (2-tailed)	.047	.233	.001	.975	.256

4.8 Comparison of the Experimental and Control Groups on Pre-Tests

As the assumption of normality of data for parametric tests was met for all indicators except for mean length of clause (MLC), complex t-unit ratio (CT/T), coordinate phrases per t-unit (CP/T) and complex nominals per t-unit (CN/T), independent samples t-test were run at the .05 level of significance for differences between control and experimental groups prior to the treatment for the remaining ten indicators, namely mean length of sentence (MLS), mean length of t-units (MLT), sentence complexity ratio (C/S), verb phrases per t-units (VP/T), t-unit complexity ratio (C/T), dependent clause ratio (DC/C), dependent clause per t-unit (DC/T), sentence coordination ratio (T/S), coordinate phrases per clauses (CP/C), and complex nominals per clause (CN/C). Table 16 shows statistics of both control and the experimental groups before the treatment.

Table 16

Control and Experimental Group Statistics (Pre-test)

Syntactic Complexity Indicators	Groups	N	Mean	Std. Deviation	Std. Error Mean
Mean Length of Sentence (MLS)	Experimental Group	15	21.2190	7.40904	1.91301
	Control Group	15	26.9513	11.09900	2.86575
Mean Length of T-units (MLT)	Experimental Group	15	16.8725	5.03699	1.30055
	Control Group	15	20.8926	8.84481	2.28372
Sentence Complexity Ratio (C/S)	Experimental Group	15	2.9319	.86980	.22458
	Control Group	15	3.1921	1.07643	.27793

Verb phrases per T-units (VP/T)	Experimental Group	15	2.8516	.76048	.19635
	Control Group	15	2.9804	.92676	.23929
T-unit Complexity Ratio (C/T)	Experimental Group	15	2.3379	.60721	.15678
	Control Group	15	2.4267	.65131	.16817
Dependent Clause Ratio (DC/C)	Experimental Group	15	.4564	.10276	.02653
	Control Group	15	.4367	.14264	.03683
Dependent Clause per T-unit (DC/T)	Experimental Group	15	1.0839	.41110	.10614
	Control Group	15	1.1197	.55413	.14308
Sentence coordination ratio (T/S)	Experimental Group	15	1.2491	.13277	.03428
	Control Group	15	1.3089	.24709	.06380
Coordinate Phrases per Clauses (CP/C)	Experimental Group	15	.2562	.12733	.03288
	Control Group	15	.2820	.10736	.02772
Complex nominals per clause (CN/C)	Experimental Group	15	.6257	.15263	.03941
	Control Group	15	.6146	.12578	.03248

As can be seen in Table 17, the independent samples t-tests are associated with no significant difference for mean length of sentence (MLS), $t(28) = -1.66$, $p = .107$, mean length of t-units (MLT), $t(28) = -1.53$, $p = .137$, sentence complexity ratio (C/S), $t(28) = -.72$, $p = .473$, verb phrases per t-units (VP/T), $t(28) = -.41$, $p = .680$, t-unit complexity ratio (C/T), $t(28) = -.38$, $p = .702$, dependent clause ratio (DC/C), $t(28) = .43$, $p = .668$, dependent clause per t-unit (DC/T), $t(28) = -.20$, $p = .842$, sentence coordination ratio (T/S), $t(28) = -.82$, $p = .416$, coordinate phrases per clauses (CP/C), $t(28) = -.6$, $p = .553$, complex nominals per clause (CN/C), $t(28) = .21$, $p = .830$.

Table 17

Independent Samples T-test Control and Experimental Group (Pre-tests)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean Length of Sentence (MLS)	Equal variances assumed	2.312	.140	-1.66	28	.107	-5.73239	3.44559	-12.79036	1.32559

	Equal variances not assumed			-1.66	24.410	.109	-5.73239	3.44559	-12.83743	1.37265
Mean Length of T-units (MLT)	Equal variances assumed	5.211	.030	-1.53	28	.137	-4.02011	2.62808	-9.40348	1.36327
	Equal variances not assumed			-1.53	22.217	.140	-4.02011	2.62808	-9.46733	1.42712
Sentence Complexity Ratio (C/S)	Equal variances assumed	1.439	.240	-.728	28	.473	-.26021	.35733	-.99216	.47175
	Equal variances not assumed			-.728	26.818	.473	-.26021	.35733	-.99362	.47320
Verb phrases per T-units (VP/T)	Equal variances assumed	.746	.395	-.416	28	.680	-.12887	.30954	-.76293	.50519
	Equal variances not assumed			-.416	26.972	.680	-.12887	.30954	-.76402	.50628
T-unit Complexity Ratio (C/T)	Equal variances assumed	.006	.938	-.386	28	.702	-.08879	.22991	-.55975	.38216
	Equal variances not assumed			-.386	27.863	.702	-.08879	.22991	-.55986	.38227
Dependent Clause Ratio (DC/C)	Equal variances assumed	.730	.400	.434	28	.668	.01968	.04539	-.07330	.11266
	Equal variances not assumed			.434	25.448	.668	.01968	.04539	-.07372	.11308
Dependent Clause per T-unit (DC/T)	Equal variances assumed	1.170	.289	-.201	28	.842	-.03585	.17815	-.40077	.32908
	Equal variances not assumed			-.201	25.828	.842	-.03585	.17815	-.40216	.33046
Sentence coordination ratio (T/S)	Equal variances assumed	8.177	.008	-.825	28	.416	-.05974	.07242	-.20810	.08862
	Equal variances not assumed			-.825	21.462	.419	-.05974	.07242	-.21016	.09068

Coordinate Phrases per Clauses (CP/C)	Equal variances assumed	.577	.454	-.600	28	.553	-.02580	.04300	-.11389	.06229
	Equal variances not assumed			-.600	27.222	.554	-.02580	.04300	-.11400	.06240
Complex nominals per clause (CN/C)	Equal variances assumed	.122	.730	.217	28	.830	.01109	.05107	-.09351	.11570
	Equal variances not assumed			.217	27.013	.830	.01109	.05107	-.09368	.11587

Also, in order to compare differences between the control and the experimental group with regard to the syntactic complexity indicators which did not have normal distribution, the Mann-Whitney U tests were run. Mean length of clause (MLC), complex t-unit ratio (CT/T), coordinate phrases per t-unit (CP/T) and complex nominals per t-unit (CN/T) were the four syntactic complexity indicators compared using Mann-Whitney U tests. Table 18 provides the test statistic, U statistic, as well as the significance p-value.

Table 18

Mann-Whitney U Tests Comparing Control and Experimental Groups (Pre-Tests)

	Mean Length of Clause (MLC)	Complex T-unit Ratio (CT/T)	Coordinate phrases per T-unit (CP/T)	Complex nominals per T-unit (CN/T)
Mann-Whitney U	88.000	102.000	89.500	107.000
Wilcoxon W	208.000	222.000	209.500	227.000
Z	-1.016	-.436	-.960	-.229
Asymp. Sig. (2-tailed)	.310	.662	.337	.819
Exact Sig. [2*(1-tailed Sig.)]	.325	.683	.345	.838

As can be seen in Table 18, it can be concluded that there is no significant difference between the control and the experimental groups in terms of mean length of clause (MLC) (U = 88, p = .310), complex t-unit ratio (CT/T) (U = 102, p = .662), coordinate phrases

per t-unit (CP/T) (U = 89, p = .337), and complex nominals per t-unit (CN/T), (U = 107, p = .819).

4.9 Comparison of the Control and Experimental Groups on Post-Tests

As was examined in the previous section, there was no significant difference between the control and the experimental group in the 14 syntactic complexity indicators prior to the treatment. This section will examine the differences between the two groups on the post-tests. To compare the differences, independent samples t-tests will be run for indicators with normal distribution data in both groups, which are mean length of sentence (MLS), mean length of t-units (MLT), mean length of clause (MLC), sentence complexity ratio (C/S), t-unit complexity ratio (C/T), dependent clause ratio (DC/C), dependent clause per t-unit (DC/T), complex t-unit ratio (CT/T), coordinate phrases per t-unit (CP/T), coordinate phrases per clauses (CP/C), complex nominals per clause (CN/C) and complex nominals per t-unit (CN/T). Table 19 shows the descriptive statistics in these indicators for both groups.

Table 19

Control and Experimental's Group Statistics on Post-tests

Syntactic Complexity Indicators	Groups	N	Mean	Std. Deviation	Std. Error Mean
Mean Length of Sentence (MLS)	Experimental Group	15	30.2644	6.16211	1.59105
	Control Group	15	14.5881	2.33400	.60264
Mean Length Of T-Units (MLT)	Experimental Group	15	18.6512	5.19754	1.34200
	Control Group	15	11.9342	1.64826	.42558
Mean Length of Clause (MLC)	Experimental Group	15	6.3957	.65794	.16988
	Control Group	15	8.2091	.68270	.17627
Sentence Complexity Ratio (C/S)	Experimental Group	15	4.7533	.96575	.24935
	Control Group	15	1.7875	.32379	.08360

T-Unit Complexity Ratio (C/T)	Experimental Group	15	2.9236	.79734	.20587
	Control Group	15	1.4598	.21193	.05472
Dependent Clause Ratio (DC/C)	Experimental Group	15	.4686	.09440	.02437
	Control Group	15	.2799	.08631	.02228
Dependent Clause Per T-Unit (DC/T)	Experimental Group	15	1.4258	.63940	.16509
	Control Group	15	.4247	.18909	.04882
Complex T-Unit Ratio (CT/T)	Experimental Group	15	.7095	.12727	.03286
	Control Group	15	.3301	.13094	.03381
Coordinate Phrases Per T-Unit (CP/T)	Experimental Group	15	.5741	.31633	.08168
	Control Group	15	.3403	.08798	.02272
Coordinate Phrases Per Clauses (CP/C)	Experimental Group	15	.1944	.10359	.02675
	Control Group	15	.2344	.05656	.01460
Complex Nominals Per T-Unit (CN/T)	Experimental Group	15	1.6691	.66732	.17230
	Control Group	15	1.1679	.23314	.06020
Complex Nominals Per Clause (CN/C)	Experimental Group	15	.5577	.09558	.02468
	Control Group	15	.8017	.12377	.03196

Table 20 shows the independent samples t-test results for the control and the experimental groups on the post-tests. As can be seen in the table below, there is a significant difference between the control and the experimental groups in all indicators of mean length of sentence (MLS) $t(28) = 9.21$, $p = .000$, mean length of t-units (MLT) $t(28) = 4.77$, $p = .000$, mean length of clause (MLC) $t(28) = -7.40$, $p = .000$, sentence complexity ratio (C/S) $t(28) = 11.27$, $p = .000$, t-unit complexity ratio (C/T) $t(28) = 6.87$, $p = .000$, dependent clause ratio (DC/C) $t(28) = 5.71$, $p = .000$, dependent clause per t-unit (DC/T) $t(28) = 5.81$, $p = .000$, complex t-unit ratio (CT/T) $t(28) = 8.04$, $p = .000$, coordinate phrases per t-unit (CP/T) $t(28) = 2.75$, $p = .010$, complex nominals per t-unit (CN/T) $t(28) = 2.74$, $p = .010$ and complex nominals per clause (CN/C) $t(28) = -6.04$, $p = .000$.

However, there is no significant difference between the two groups in coordinate phrases per clauses (CP/C) t (28) = -1.31, p = .200 on the post-test.

Table 20

Control and Experimental Groups' Independent Samples Tests (Post-tests)

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Mean Length of Sentence (MLS)	Equal variances assumed	6.306	.018	9.214	28	.000	15.67633	1.70136	12.19126	19.16140
	Equal variances not assumed			9.214	17.936	.000	15.67633	1.70136	12.10100	19.25167
Mean Length of T-units (MLT)	Equal variances assumed	15.258	.001	4.771	28	.000	6.71702	1.40786	3.83315	9.60089
	Equal variances not assumed			4.771	16.788	.000	6.71702	1.40786	3.74383	9.69021
Mean Length of Clause (MLC)	Equal variances assumed	.035	.852	-7.408	28	.000	-1.81342	.24481	-2.31489	-1.31195
	Equal variances not assumed			-7.408	27.962	.000	-1.81342	.24481	-2.31492	-1.31192
Sentence Complexity Ratio (C/S)	Equal variances assumed	14.212	.001	11.277	28	.000	2.96588	.26300	2.42716	3.50460
	Equal variances not assumed			11.277	17.108	.000	2.96588	.26300	2.41127	3.52049
T-unit Complexity Ratio (C/T)	Equal variances assumed	17.141	.000	6.871	28	.000	1.46376	.21302	1.02741	1.90011
	Equal variances not assumed			6.871	15.968	.000	1.46376	.21302	1.01210	1.91542
Dependent Clause Ratio (DC/C)	Equal variances assumed	.164	.688	5.714	28	.000	.18872	.03303	.12107	.25637
	Equal variances not assumed			5.714	27.778	.000	.18872	.03303	.12105	.25639

Dependent Clause per T-unit (DC/T)	Equal variances assumed	11.753	.002	5.815	28	.000	1.00109	.17216	.64843	1.35374
	Equal variances not assumed			5.815	16.430	.000	1.00109	.17216	.63690	1.36527
Complex T-unit Ratio (CT/T)	Equal variances assumed	.025	.875	8.046	28	.000	.37935	.04715	.28277	.47592
	Equal variances not assumed			8.046	27.977	.000	.37935	.04715	.28277	.47593
Coordinate phrases per T-unit (CP/T)	Equal variances assumed	12.869	.001	2.758	28	.010	.23383	.08478	.06018	.40749
	Equal variances not assumed			2.758	16.153	.014	.23383	.08478	.05425	.41341
Coordinate Phrases per Clauses (CP/C)	Equal variances assumed	2.376	.134	-1.311	28	.200	-.03995	.03047	-.10238	.02247
	Equal variances not assumed			-1.311	21.667	.204	-.03995	.03047	-.10321	.02330
Complex nominals per T-unit (CN/T)	Equal variances assumed	8.223	.008	2.746	28	.010	.50117	.18251	.12730	.87503
	Equal variances not assumed			2.746	17.367	.014	.50117	.18251	.11671	.88562
Complex nominals per clause (CN/C)	Equal variances assumed	.972	.333	-6.042	28	.000	-.24397	.04038	-.32668	-.16127
	Equal variances not assumed			-6.042	26.317	.000	-.24397	.04038	-.32692	-.16103

Also, to compare differences between indicators which did not come from normal distribution, namely verb phrases per t-units (VP/T) and sentence coordination ratio (T/S) in the post-test, non-parametric Mann-Whitney U tests were run.

Table 21

Mann-Whitney U Tests Comparing Control and Experimental Groups (Post-Tests)

	Verb phrases per T-units (VP/T)	Sentence Coordination ratio (T/S)
Mann-Whitney U	2.000	16.500
Wilcoxon W	122.000	136.500
Z	-4.585	-3.987
Asymp. Sig. (2-tailed)	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.000	.000

As Table 21 indicates, there is a significant difference between the two groups in terms of verb phrases per t-units (VP/T) ($U = 2$, $p = .000$) and sentence coordination ratio (T/S) ($U = 16.5$, $p = .000$).

Chapter 5
Results from the Questionnaire

The second question raised in this study concerned how the EFL learner participants perceive the effectiveness of online computer-mediated speaking task. Regarding the second question raised in this study, a cross-sectional questionnaire was administered surveying five items of teaching presence, social presence, cognitive presence, CMC tool helpfulness items, and learners' comfort level. This questionnaire had originally been developed and used in a study carried out by Salloum (2011), and it included 43 Likert-scale questions. It has been suggested that to efficiently deliver an online course, it is important for course designers to take the students' experiences into account. Previous research has resulted in the development of a model called the Community of Inquiry for that purpose. Researchers created this model with the goal of making an effective and enjoyable online learning experience for students. The questionnaire developed for this purpose consists of five concepts including teaching presence, social presence, and cognitive presence as well as tool helpfulness and learners' comfort level (Garrison, 2007; Garrison & Arbaugh, 2007; Swan, Garrison, & Richardson, 2009; Garrison, Anderson, & Archer, 2010). The questionnaires in this study were distributed after the treatment ended to learners who participated in the study in the experimental group. Reflecting on what they had experienced as CMC, the participants took approximately 45 minutes to one hour to fill out these questionnaires. The participants filling out the questionnaires were given the opportunity to ask the researcher what particular questions and words in the survey meant if there was any confusion. Totally, 14 completed questionnaires were collected. Following the collection of data, each respondent's answer to each statement was entered individually

into a computer spreadsheet. Descriptive statistics was used to analyze quantitative data generated by the Likert-scale question types. Results from the Likert-scale items on the questionnaires are presented in Table 22 indicating the percentage of responses for each item on the questionnaire.

Table 22

Survey Questionnaire

	SD	D	U	A	SA
Teaching Presence					
Design and Organization					
1. The discussion facilitator clearly communicated important discussion topics.	7.1	7.1	14.2	28.6	35.7
2. The discussion facilitator clearly communicated important discussion goals.	21.4	7.1	7.1	21.4	42.8
3. The discussion facilitator provided clear instructions on how to participate in discussions and learning activities.	14.2	7.1	7.1	35.7	35.7
4. The discussion facilitator clearly communicated important due dates/time frames for learning activities.	7.1	7.1	14.2	28.6	35.7
Facilitation					
5. The discussion facilitator was helpful in identifying areas of agreement and disagreement on discussion topics that helped me to learn.	14.2	7.1	7.1	35.7	35.7
6. The discussion facilitator was helpful in guiding the group towards understanding discussion topics in a way that helped me clarify my thinking.	21.4	7.1	7.1	21.4	42.8
7. The discussion facilitator helped to keep discussion participants engaged and participating in productive dialogue.	7.1	7.1	14.2	28.6	35.7

8. The discussion facilitator helped keep the discussion participants on task in a way that helped me to learn.	14.2	7.1	14.2	14.2	50
9. The discussion facilitator encouraged discussion participants to explore new concepts in this group.	21.4	7.1	7.1	21.4	42.8
10. Discussion facilitator actions reinforced the development of a sense of community among participants.	7.1	7.1	14.2	28.6	35.7
Direct Facilitation					
11. The discussion facilitator helped to focus discussion on relevant issues in a way that helped me to learn.	21.4	7.1	7.1	21.4	42.8
12. The discussion facilitator provided feedback that helped me understand my strengths and weaknesses.	14.2	35.7	14.2	28.6	7.1
13. The discussion facilitator provided feedback in a timely fashion.	7.1	7.1	14.2	28.6	35.7
Social Presence					
Affective expression					
14. Getting to know other participants gave me a sense of belonging in the group.	14.2	7.1	14.2	14.2	50
15. I was able to form distinct impressions of other participants.	14.2	7.1	7.1	35.7	35.7
16. Online or web-based communication is an excellent medium for social interaction.	7.1	7.1	14.2	28.6	35.7
Open Communication					
17. I felt comfortable conversing through the online medium.	14.2	7.1	14.2	14.2	50
18. I felt comfortable participating in the study discussions.	21.4	7.1	7.1	21.4	42.8
19. I felt comfortable interacting with other study participants.	7.1	7.1	14.2	28.6	35.7
Group Cohesion					

20. I felt comfortable disagreeing with other study participants while still maintaining a sense of trust.	14.2	7.1	7.1	35.7	35.7
21. I felt that my point of view was acknowledged by other study participants.	21.4	7.1	7.1	21.4	42.8
22. Online discussions help me to develop a sense of collaboration.	7.1	7.1	14.2	28.6	35.7
Cognitive Presence					
Triggering Event					
23. Topics and questions posed increased my interest in study issues.	21.4	7.1	7.1	21.4	42.8
24. Study activities piqued my curiosity.	7.1	7.1	14.2	28.6	35.7
25. I felt motivated to explore content related questions.	21.4	7.1	7.1	21.4	42.8
Exploration					
26. I utilized a variety of information sources to explore topics posed in this study.	21.4	7.1	7.1	21.4	42.8
27. Brainstorming and finding relevant information helped me resolve content related questions.	21.4	7.1	7.1	21.4	42.8
28. Online discussions were valuable in helping me appreciate different perspectives.	14.2	7.1	14.2	14.2	50
Integration					
29. Combining new information helped me answer questions raised in study activities.	14.2	7.1	14.2	14.2	50
30. Learning activities helped me construct explanations/solutions.	21.4	7.1	7.1	21.4	42.8
31. Reflection on study content and discussions helped me understand fundamental concepts in this group.	14.2	7.1	14.2	14.2	50
Resolution					
32. I can describe ways to test and apply the knowledge created in this study.	21.4	7.1	7.1	21.4	42.8

33. I have developed solutions to study problems that can be applied in practice.	14.2	7.1	14.2	14.2	50
34. I can apply the knowledge created in this study to my work or other non-class related activities.	7.1	14.2	7.1	35.7	35.7
CMC Tool Helpfulness Items					
Helpfulness for teaching presence items					
35. Using Computer-mediated communication was helpful for receiving information from my discussion facilitator about study topics, goals and learning activities.	14.2	7.1	7.1	35.7	35.7
36. Using Computer-mediated communication was helpful for receiving directions or clarification from my discussion facilitator.	7.1	7.1	14.2	28.6	35.7
37. Using Computer-mediated communication was helpful for receiving personal feedback from my discussion facilitator.	28.6	35.7	14.2	7.1	7.1
38. Using Computer-mediated communication was helpful for communicating questions or concerns to my discussion facilitator.	7.1	14.2	14.2	28.6	35.7
Helpfulness for Social Presence Items					
39. Using Computer-mediated communication was helpful for getting to know other study participants.	14.2	14.2	7.1	21.4	42.8
40. Using Computer-mediated communication was helpful for interacting and collaborating with other study participants.	7.1	7.1	14.2	35.7	28.6
Comfort level					
41. I was comfortable using computer-mediated communication.	14.2	7.1	14.2	14.2	50
42. I am comfortable taking courses online.	7.1	14.2	14.2	50	14.2
43. I can learn effectively through online courses.	21.4	7.1	7.1	21.4	42.8

Chapter 6
Discussion

6. 1 Research Question 1:

Does online computer-mediated speaking practice have effect on Iranian intermediate EFL learners' oral performance in terms of syntactic complexity?

To answer the first research question, the following hypothesis was formulated.

H0. Online computer-mediated speaking task does not have an effect on Iranian intermediate EFL learners' oral English performance.

Data were collected from two different groups of participants to see whether there was a statistically significant difference in the mean scores for the control and the experimental groups. To test the above-mentioned hypothesis, independent samples t-tests as well as Mann-Whitney U tests were run. Mann-Whitney U tests are nonparametric tests used as an alternative to a parametric independent samples t-test when there is a violation of normality of data (Tavakoli, 2012). Independent samples t-tests and the Mann-Whitney U tests results revealed that there were no statistically significant differences before the treatment.

Also, independent samples t-tests and the Mann-Whitney U tests which were run after the treatment revealed that the participants of this study improved significantly in the following indicators of syntactic complexity: mean length of sentence (MLS), mean length of t-units (MLT), sentence complexity ratio (C/S), verb phrases per t-units (VP/T), t-unit complexity ratio (C/T), dependent clause ratio (DC/C), dependent clause per t-unit (DC/T), sentence coordination ratio (T/S), complex t-unit ratio (CT/T), coordinate phrases per t-unit (CP/T), complex nominals per t-unit (CN/T). As a result, it can be concluded that the participants in the experimental group could not outperform participants in the control

group in the following three indicators: mean length of clause (MLC), coordinate phrases per clauses (CP/C) and complex nominals per clause (CN/C).

Based on the independent samples t-tests performed, it can be concluded that hypothesis formulated can be rejected for 11 syntactic complexity indicators mentioned above and online computer-mediated speaking tasks have a significant effect on the oral production of the participants of this study. The following sections will further discuss the findings under separate categories of syntactic complexity.

6.1.1 Category 1: Length of Production Unit

The first category consists of three indicators that measures length of production at the three levels of clause, sentence, and T-unit, in two of which, the participants in the experimental group performed significantly better than the participants in the control group, namely mean length of sentence (MLS), mean length of t-units (MLT).

6.1.2 Category 2: Sentence Complexity

The second category has only one indicator which is sentence complexity ratio. In this category the experimental group did significantly better than the control group.

6.1.3 Category 3: Amount of Subordination

The third category is comprised of four indicators that indicate the amount of subordination, including a T-unit complexity ratio (C/T), a complex T-unit ratio (CT/T), a dependent clause ratio (DC/C), and dependent clauses per T-unit (DC/T). There was a significant difference in all four indicators of this category between the control and the experimental group. The participants receiving online discussion practice in this study outperformed participants in the control group.

6.1.4 Category 4: Amount of Coordination

The fourth category has three indicators that gauge the amount of coordination including coordinate phrases per clause (CP/C), coordinate phrases per T-unit (CP/T), and a sentence coordination ratio (T/S). Coordinate phrases per clause (CP/C) was the only indicator on which the experimental group could not perform better than the control group following the treatment. Experimental group participants performed significantly better than the control group participants in both coordinate phrases per T-unit (CP/T), and a sentence coordination ratio (T/S).

6.1.5 Category 5: Particular Structures

The final category is made up of three syntactic complexity indicators measuring the relationship between particular syntactic structures and other production units, namely, complex nominals per clause (CN/C), complex nominals per T-unit (CN/T), and verb phrases per T-unit (VP/T). The treatment led to a significantly better performance on post-tests by the experimental group on the two indicators of complex nominals per T-unit (CN/T), and verb phrases per T-unit (VP/T).

According to Warschauer (1995), syntactic complexity is related to oral performance and learners with better language skills often use more syntactically complex structures on the average. However, the findings of Abram's (2003) study concluded that online CMC had no significant impact on syntactic complexity in oral performance. In conclusion, the results of this study are inconsistent with Abrams's study as the participants in the experimental group receiving online CMC treatment outperformed the participants in the control group in eleven syntactic complexity indicators.

In conclusion, the findings of this study are consistent with previous studies as it has been consistently claimed that CMC can stimulate participation among learners (Chun,

1994; Warschauer, 1995). Besides, online CMC can also improve the participants' chance of contribution in conversations and leads to higher levels of student motivation (Beauvois, 1998). Moreover, this study confirmed the results of study conducted by Sotillo (2000), which concluded that asynchronous CMC helped improve syntactic complexity of language learners.

6. 2 Research Question 2:

The following section presents the results from the questionnaires in further details by grouping items into categories that address the same issue.

6.2.1 Category 1: Teaching Presence (Questions 1-13)

Teaching Presence addressed design and organization, facilitation and direct facilitation in this study. The items dealing with this category concerned the facilitation of discussions and how well the researcher could communicate the topics and time frames as well as providing instructions on how to participate in discussions.

As can be seen in Table 16, most of the students (70%) indicated that the instructions were clear (agreed or strongly agreed), and more than 64% of the participants said that the researcher was successful in keeping the participants on task. However, only one third of the respondents believed that they received personal feedback from the researcher regarding their strengths and weaknesses. It needs to be mentioned that all questions pertaining to technical difficulty for online communications were answered by the researcher. However, in order not to interfere with the treatment, the questions regarding grammatical rules and vocabulary were not answered to avoid any significant influence on learners' improvement. Students were asked to find the answers on their own.

Overall, the respondents provided positive feedback with regard to the facilitator's presence.

6.2.2 Category 2: Social Presence (Questions 14-22)

The second category in this survey addressed affective expression, open communication and group cohesion in this study.

As indicated by Table 16, with regard to affective expression, more than 64% of the responses reported that participants felt a sense of belonging in the group and found online CMC an excellent medium for interaction. As far as open communication is concerned, two thirds of responses indicated the feeling of comfort while communicating through online CMC. Concerning group cohesion, approximately 79% of the respondents were comfortable disagreeing with other participants and they believed their points of view were acknowledged.

6.2.3 Category 3: Cognitive Presence (Questions 23-34)

The third category this survey investigated dealt with cognitive presence. This category included items that further examined triggering event, exploration, integration and resolution.

As Table 22 shows, almost two thirds of the respondents stated that questions and topics raised in this study increased their interest. Moreover, in discussing the topics, the participants consulted various resources to further explore the topics and used brainstorming techniques which was useful in participating in discussions. Regarding integration, respondents reported that they reflected on the discussions which resulted in constructing explanations and solutions. Concerning resolution, most of the participants

strongly agreed or agreed that they could apply the knowledge gained and the solutions proposed in discussions to other activities.

6.2.4 Category 4: CMC Tool Helpfulness Items (Questions 35-40)

This category addressed helpfulness for teaching presence items and social presence items. The responses to this section of the questionnaire implies participant's agreement to statements about helpfulness of online CMC with regard to receiving information, directions and clarifications. Nevertheless, the amount of personal feedback the participants received did not seem to persuade respondents of its adequacy as only 14% reported that the feedback provided by the researcher was helpful. As for helpfulness of social presence, participants agreed to helpfulness of online CMC for social interactions and collaboration.

6.2.5 Category 5: Comfort Level (Questions 41-43)

Finally, the participants expressed high levels of confidence in working with CMC. They reported that they could effectively work with online CMC, and they felt comfortable taking similar online courses.

In conclusion, the participants' overall feedback to online CMC was positive regarding teaching, social and cognitive presence as well as helpfulness of this online communication tool and its comfort level. However, participants expected to receive more personal feedback which they believed was inadequate in this study.

Chapter 7
Conclusion

7.1 Overview

This chapter provides conclusions drawn from the statistical analysis in the previous chapter. Besides, the conclusions are discussed in the light of previous studies. In addition, the possible implications for EFL teachers and learners are discussed considering the limitations of the study that have been identified and pointed out. Finally, suggestions for further research in the related areas are also provided.

7.2 Conclusions

With respect to the inferential statistics, it can be stated that based on the statistical analysis, the hypothesis formulated was rejected:

H_0. Online computer-mediated speaking task does not have an effect on Iranian intermediate EFL learners' oral English performance.

In other words, it was supported that online computer-mediated speaking tasks had significant impacts on Iranian intermediate EFL learners' oral production in terms of syntactic complexity on eleven of the fourteen indicators investigated in this study, namely, mean length of sentence (MLS), mean length of T-units (MLT), sentence complexity ratio (C/S), verb phrases per t-units (VP/T), T-unit complexity ratio (C/T), dependent clause ratio (DC/C), dependent clause per T-unit (DC/T), sentence coordination ratio (T/S), complex T-unit ratio (CT/T), coordinate phrases per T-unit (CP/T), and complex nominals per T-unit (CN/T). The results revealed that after taking part in online computer-mediated speaking tasks as the treatment, the intermediate EFL learner participants of this study developed more syntactically complex structures. Future research could focus on why the remaining indicators of mean length of clause (MLC), coordinate phrases per clauses

(CP/C), complex nominals per clause (CN/C) indicators did not improve significantly so that informed decisions could be made in terms of research and pedagogical implications of this topic.

Moreover, according to Salloum (2011), whether online learning can prove effective partly depends on student perceptions of social, teaching, and cognitive presence. These items along with helpfulness and comfort level of the participants can help promote effective communications among the learners and their instructor. In this study, the participants expressed overall satisfaction with regard to the online CMC tool used and this could be a possible explanation for the results obtained as they could be attributable to comfort level of the learners taking part in this research. Lee (2004) also conducted surveys and the findings from that study revealed consistent results with this study as the participants indicated that online CMC was a positive experience for them.

7.3 Implications of the Study

The findings have some implications for both English teachers and learners. Since the time available in language classes in an EFL context may not suffice for effective language learning and teaching, and English is not the main language of communication outside the classroom, teachers may choose to persuade EFL learners to use online communication tools to extend learning beyond the language classroom.

Based on this research and its findings, online computer-mediated communication practice can be effective for improving oral performance in terms of syntactic complexity. Therefore, teachers may choose to use WhatsApp or similar online messaging applications to engage language learners in discussion practice for the purpose of progress in oral production of more syntactically complex structures. Teachers could establish online

communication with their students and attempt to persuade them to engage in discussion tasks with the teacher or other language learners as well. Considering the main feature of WhatsApp Messenger, namely space where learning occurs, it could represent a virtual classroom (Damm, 2016). As a result, if bundled together with traditional classroom activities, it is expected that the employing WhatsApp or similar messaging applications could promote language learning. However, it has been suggested that implementing CMC in the language classroom requires consideration of its pedagogical effects and not the technology. “Pedagogical objectives of a task”, “appropriateness of CMC tool” and “authenticity of context” need to be considered by the instructor before implementation of the CMC tool (Goertler, 2009, p. 75).

In addition, it has been suggested that a small amount of class time be devoted to the computer literacy of language learners through training learners in terms of technicalities as students can benefit from this training (Barrette, 2001). Likewise, teachers and researchers also need technological competence, as small details can cause difficulty in the teaching or research process (Lamy et al. 2007).

Large class size has also been identified as one on the main challenges of the classrooms as teachers now may have to handle bigger classes (Ramsden, 2003). To address this issue, language teachers can use online teaching tools available, such as WhatsApp Messenger which allows up to 250 students to join a group for discussion and learning purposes.

Computer-mediated communication can also have other benefits for language teachers. According to Tallon (2009), teachers in EFL contexts need to help students to cope with anxiety and need to try to make the learning context less threatening and stressful

for learners. Since in this type of communication language learners are not engaged in face to face communication with each other, it has been argued that level of anxiety could be reduced (Satar and Özdener 2008). Therefore, English teachers can take advantage of this characteristic of computer-mediated communication in this area.

However, AbuSeileek and Abualshar (2014), have recognized the need for conducting more studies about the effectiveness of different types of computer-mediated communication practice tasks because it is necessary to examine the effectiveness of each task type on facilitating language learning as well; therefore, more research is needed so that the advantages and disadvantages of various types of such communication tools could be identified. The results of this study should provide some evidence of the effectiveness of discussion tasks which could be adopted to help language learners in terms of syntactic complexity in their oral production.

Furthermore, an issue that needs to be considered is that learners in asynchronous online CMC may at times be less motivated to participate in the discussions as a result of the extended nature of the interaction as they sometimes have to wait several days on occasions before other members of their discussion group post their own comments. Such delays in response can interrupt the momentum at times and may reduce motivation of other learners of the group. As a consequence, the researcher of this study had to frequently follow up on delays in participation in the discussion tasks assigned. Likewise, another concern that needs to be addressed accordingly is that learners may take out-of-class assignments less seriously than those which take place within the regular classroom setting. Due to the various reasons advanced, it is recommended that these groups should be

teacher- or facilitator-led so that the facilitator can make sure all the learners contribute as requested.

Regarding the limitations of the study, it needs to be mentioned that the scope of this study was narrowed down to syntactic complexity on intermediate EFL learners' production on WhatsApp Messenger. Learners at other levels of proficiency may not benefit from synchronous and asynchronous computer-mediated communication practice equally, so the inclusion of various levels of language proficiency such as elementary or advanced levels could also be informative; however, due to the limitations in the number of participants and classes, it was not possible to include other levels of proficiency in the present study. Also, it has been argued that running multiple t-tests can lead to higher chances of Type I error. In view of this problem, the findings of this study should be used cautiously.

Regarding generalization of the findings of this study, while definitions vary, discussions generally agree that experiments are not high in external validity than other methodological approaches as there is no guarantee that these findings will repeat under same conditions (McTavish & Loether, 2002), and the results may not be easily generalized to other times, contexts, or groups of people (Monette, Sullivan, and DeJong, 2002). Therefore, the results of such studies should cautiously be generalized.

7.4 Suggestions for Further Research

Based on the previous research done in this area and the results of the current study and limitations, the following suggestions could be made for further research in CMC.

Since all tasks used in this study were in the oral form, some evidence related to the effectiveness of written CMC through computer technologies, along with the

correlation of writing and speaking tasks and their role on syntactic complexity is also required. Other researchers may find it useful to compare the impact of speaking and writing computer-mediated tasks for improving learners' performance in terms of syntactic complexity. Furthermore, a combination of speaking and writing tasks may introduce a specific type of teaching tool whose impact on the learning of different language skills and sub-skills can be investigated.

Future research could also investigate the impact of online CMC on lexical complexity. Since vocabulary is an essential component of language learning, finding ways of teaching vocabulary through online CMC could be useful especially for EFL learners. It is recommended that the differential impacts of synchronous and asynchronous computer-mediated communication on language skills such as writing, reading, speaking and listening be investigated further. Since the nature of language skills is different, the impacts of synchronous and asynchronous computer-mediated communication tools may vary across different language skills.

In addition, to gain a more comprehensive, accurate and clearer picture regarding the effectiveness of synchronous and asynchronous online communication practice, similar studies should be conducted across various levels of proficiency.

Future research should also investigate and provide empirical evidence about other aspects of language in its oral form such as negotiation of meaning, and the effect of different task types, to mention a few, to further investigate the effect or possible benefits of online CMC. In addition, more frequent online CMC sessions could better reflect the nature of its effect on oral performance of language learners (Abrams, 2003). It could be possible that using online CMC over the course of several months or years can have more

significant benefits for the development of oral skills. Future research addressing these main concerns should yield valuable insights with regard to the variables affecting online computer-mediated communication by further examining both EFL and ESL contexts.

Moreover, the high "rates of the dropout" and "inconsistent participation" on the part of the learners have been identified by previous research as problems associated with online courses (Damm, 2016, p. 142). In order to address these main issues, more research is needed to find ways to keep learners motivated, increase their participation by engaging them and helping them maintain a high level of commitment to meet the educational objectives set in similar online courses. Also, further studies are required to examine how language teachers can efficiently integrate CMC environments into language courses and develop tasks that result in the successful implementation of CMC (Mahdi, 2004).

Finally, this study was conducted with participants who were adult, male language learners. Female learners may react differently to receiving online CMC practice as gender as an affecting factor as been studied and significant differences have been found regarding speaking and writing proficiency in second language (Slik, Hout, & Schepens, 2015). Besides, this type of CMC may not be useful to the same degree for children. Due to their unique characteristics; children may not benefit from online CMC to the same extent as adults. Consequently, further research evidence is needed to support online CMC's pedagogical significance for learners of different ages, genders, and proficiency levels and enrich the analysis and conclusions made in this study.

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Appendix

Appendix A

Pretest Interview Questions

Part 1

Now, in this first part of the test I'm going to ask you some questions about yourself.

- Are you a student or do you work now?
- Why did you choose this course/job?
- Is there anything about your course/job you would like to change?

I'd like to move on and ask you some questions about shopping.

- Who does most of the shopping in your household?
- What type of shopping do you like? (Why?)
- Is shopping a popular activity in your country? (Why/why not?)
- What type of shops do teenagers like best in your country?

Let's talk about films.

- How often do you go to the cinema?
- What type of films do you like best? (Why?)
- What type of films don't you like? (Why not?)

Part 2

- Describe an important event in your life.

You should say:

- When it happened
- Who you were with
- What happened
- And explain why you feel it was important.

- Do you still think about this event often?
- Can the other people involved remember this event?

Part 3

What days are important in your country?

Why it is important to have national celebrations?

How is the way your national celebrations are celebrated now different from the way they were celebrated in the past?

Appendix B

Post-test Interview Questions

Part 1

Let's talk about your hometown or village.

- What kind of place is it?
- What's the most interesting part of your town/village?
- What kind of jobs do the people in your town/village do?
- Would you say it's a good place to live? (Why?)
- Let's move on to talk about accommodation.
- Tell me about the kind of accommodation you live in?
- How long have you lived there?
- What do you like about living there?
- What sort of accommodation would you most like to live in?

Part 2

Describe something you own which is very important to you. You should say:

where you got it from how long you have had it what you use it for and explain why it is important to you.

- Is it valuable in terms of money?
- Would it be easy to replace?

Part 3

Let's consider first of all how people's values have changed.

- What kind of things give status to people in your country?
- Have things changed since your parents' time?
- Finally, let's talk about the role of advertising.
- Do you think advertising influences what people buy?

Appendix C
Tasks

Task 1

Some people say that drugs should be legalized much the same way as alcohol and tobacco are bought and sold freely. These people believe that doing so would eliminate the underground market for drugs and thus reduce the crime we have in the world nowadays. However, many people disagree with the notion of legalising drugs. Discuss your reasons why drugs should or should not be legalised.

Task 2

What are your ideas about the following statements? Discuss your reasons.

1. Everybody should be able to live where they choose. Freedom of movement is a civil right.
2. People should stay and live in the country where they are born.
3. Immigration is one of the biggest problems of our time.
4. There should be more help available to immigrants to adapt to their new country.
5. In an ideal world nobody would need to emigrate.
6. People can not be ‘illegal’.
7. Immigration makes countries more interesting and helps people become more tolerant.

Task 3

A city with a population of 400,000 people has just set aside $110,000 of its annual budget for aids prevention. The city wants to increase AIDS awareness. Work with other students with ways the city can spend this money in the most effective manner

Task 4

What is your opinion about capital punishment and other tough penalties for gun related crimes? Discuss your reasons.

Task 5

What is your opinion about euthanasia? Discuss your reasons. You can answer the following questions.

1. Do you agree with euthanasia?
2. Do you understand why people choose euthanasia to end their life?

3. The Ancient Greek for euthanasia is ‘good death’. What do you think of this meaning?
4. ‘Passive euthanasia’ is where somebody refuses medication knowing they will die without it. Do you think this is OK?
5. ‘Non-aggressive euthanasia’ is where life support systems keeping someone alive are switched off. What do you think of this?

Task 6

Animals are used everyday to test the effect of products such as skin creams and colognes as well as various medicines which may be harmful to humans. Because some of the testing causes the animals pain and death, many people are against this use of animals. It is even possible to find products that are labeled “Not Tested on Animals” so that consumers can have this option if they wish.

1. How do you feel about this use of animals?
2. Give your reasons to support your view.

Task 7

Below are the main causes of animal extinction.

Rank the items given from the most destructive to the least.

Discuss your choices and the reasons for your choices

- Overhunting
- Pollution
- Climate change
- Habitat alteration

Task 8

What is your opinion on mandatory retirement?

State your opinion and give reasons to support that opinion.

1. What would be a perfect retirement age? Why?
2. Should people be forced to retire if they can and want to work? Why?

Appendix D
CMC Survey Questionnaire

Please tick the box that most accurately captures your responses to the following statements.

SD = Strongly Disagree; D = Disagree; U= Undecided; A= Agree; SA= Strongly Agree

	SD	D	U	A	SA
Teaching Presence					
Design and Organization					
1. The discussion facilitator clearly communicated important discussion topics.					
2. The discussion facilitator clearly communicated important discussion goals.					
3. The discussion facilitator provided clear instructions on how to participate in discussions and learning activities.					
4. The discussion facilitator clearly communicated important due dates/time frames for learning activities.					
Facilitation					
5. The discussion facilitator was helpful in identifying areas of agreement and disagreement on discussion topics that helped me to learn.					
6. The discussion facilitator was helpful in guiding the group towards understanding discussion topics in a way that helped me clarify my thinking.					
7. The discussion facilitator helped to keep discussion participants engaged and participating in productive dialogue.					
8. The discussion facilitator helped keep the discussion participants on task in a way that helped me to learn.					
9. The discussion facilitator encouraged discussion participants to explore new concepts in this group.					
10. Discussion facilitator actions reinforced the development of a sense of community among participants.					
Direct Facilitation					
11. The discussion facilitator helped to focus discussion on relevant issues in a way that helped me to learn.					
12. The discussion facilitator provided feedback that helped me understand my strengths and weaknesses.					
13. The discussion facilitator provided feedback in a timely fashion.					
Social Presence					
Affective expression					

14. Getting to know other participants gave me a sense of belonging in the group.
15. I was able to form distinct impressions of other participants.
16. Online or web-based communication is an excellent medium for social interaction.
Open Communication
17. I felt comfortable conversing through the online medium.
18. I felt comfortable participating in the study discussions.
19. I felt comfortable interacting with other study participants.
Group Cohesion
20. I felt comfortable disagreeing with other study participants while still maintaining a sense of trust.
21. I felt that my point of view was acknowledged by other study participants.
22. Online discussions help me to develop a sense of collaboration.
Cognitive Presence
Triggering Event
23. Topics and questions posed increased my interest in study issues.
24. Study activities piqued my curiosity.
25. I felt motivated to explore content related questions.
Exploration
26. I utilized a variety of information sources to explore topics posed in this study.
27. Brainstorming and finding relevant information helped me resolve content related questions.
28. Online discussions were valuable in helping me appreciate different perspectives.
Integration
29. Combining new information helped me answer questions raised in study activities.
30. Learning activities helped me construct explanations/solutions.
31. Reflection on study content and discussions helped me understand fundamental concepts in this group.
Resolution
32. I can describe ways to test and apply the knowledge created in this study.

33. I have developed solutions to study problems that can be applied in practice.
34. I can apply the knowledge created in this study to my work or other non-class related activities.
CMC Tool Helpfulness Items
Helpfulness for teaching presence items
35. Using Computer-mediated communication was helpful for receiving information from my discussion facilitator about study topics, goals and learning activities.
36. Using Computer-mediated communication was helpful for receiving directions or clarification from my discussion facilitator.
37. Using Computer-mediated communication was helpful for receiving personal feedback from my discussion facilitator.
38. Using Computer-mediated communication was helpful for communicating questions or concerns to my discussion facilitator.
Helpfulness for Social Presence Items
39. Using Computer-mediated communication was helpful for getting to know other study participants.
40. Using Computer-mediated communication was helpful for interacting and collaborating with other study participants.
Comfort level
41. I was comfortable using computer-mediated communication.
42. I am comfortable taking courses online.
43. I can learn effectively through online courses.