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Research Paper

Pronunciation Achievement in Computer-Mediated Communication (CMC) Classrooms

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Abstract

The current mixed method study investigated the use of synchronous/asynchronous computer-mediated communication as a method of L2 pronunciation achievement among medical students during COVID-19 pandemic lockdown. In so doing, the study utilized an experimental comparative design with two groups of 17 participants. There were two types of tests in this study: word stress test, and a semi-structured interview. The results showed the positive effect of computer mediated communication in pronunciation development among students of medicine. Moreover, the findings revealed more positive effect of synchronous computer mediated communication-oriented instruction compared with asynchronous computer mediated communication-oriented instruction on medical students' English language pronunciation development. It can be concluded that computer mediated communication especially synchronous mode is effective for pronunciation development of medical students since technology provides the opportunities through which medical students can notice the gaps in their current English language and thus produce modified output.

Keywords: *Medical students, pronunciation achievement, computer-mediated communication*

یادگیری تلفظ در کلاسهای کامپیوتری از راه دور

مطالعه روش ترکیبی حاضر استفاده از ارتباط کامپیوتری بصورت همزمان / ناهمزمان را بعنوان راهی برای فراگیری تلفظ زبان دوم در بین دانشجویان رشته پزشکی در طول قرنطینه پاندمی کوید-19 بررسی نمود. برای انجام این امر مطالعه حاضر از طراحی تجربی مقایسه ای با دو گروه 17 نفری از شرکت کنندگان بهره گرفت. دو نمونه از موزون در این مطالعه مورد استفاده قرار گرفت: تست استرس یا فشار کلمه و یک مصاحبه نیمه ساختاری شده. نتایج نشانگر تاثیر مثبت ارتباط از طریق کامپیوتر بر یادگیری تلفظ دانشجویان پزشکی بود. علاوه بر آن یافته ها حاکی از تاثیر مثبت آموزش کامپیوتری همزمان در مقایسه با آموزش کامپیوتری ناهمزمان بر فراگیری تلفظ دانشجویان رشته یاد شده بود. بنابر این می توان نتیجه گرفت که ارتباط کامپیوتری بویژه بصورت همزمان بر یادگیری تلفظ دانشجویان رشته پزشکی ماثر است زیرا که تکنولوژی فرصتهایی را ارایه می کند که از طریق آن دانشجویان پزشکی می توانند متوجه اشکالات حال حاضر زبان انگلیسی شان شده و در صدد تغییر و اصلاح آن بیایند.

واژگان کلیدی: دانشجویان رشته پزشکی، فراگیری تلفظ، ارتباط از طریق کامپیوتر

Introduction

Today most forms of interaction are changed from face to face to digital form concerning COVID-19 pandemic lockdown. The transition from face-to-face classes to online instruction brings about a massive challenge for both teachers and students (Hodges, Moore, Lockee, Trust, & Bond, 2020). They need to adapt to a new teaching process in virtual environments to continue their labor of educating learners. To do such a thing, educators encounter and interact with different online resources available (e.g., learning systems, video conferences chats, online games, and other collaborative spaces).

For medical students learning a second language means much more than memorizing a new set of vocabulary and a few syntactic and grammatical rules. Different scholars have reported that effective communication is impossible when nonnative speakers' pronunciation falls below a certain threshold level, even when their vocabulary and grammar are perfect (Levis, 2018). Despite this general lack of attention to pronunciation, students show enthusiasm to learn more about pronunciation and hold the belief that it is an integral component of language learning (Levis & Grant, 2003). Consequently, a growing bulk of research has begun to investigate new methods of instruction for L2 pronunciation out of which one method of particular interest has been highlighted: a combination of pronunciation instruction with the use of speech analysis technology. Fortunately, technology supports teachers' and learners' understanding and acquisition of new pronunciation patterns (Wallace & Lima, 2018).

The importance of English language in the field of medicine is due to the fact that most of the scientific, technological, and academic information in the field of medicine is dominantly expressed and presented in English (Creswell, 2013) and a lack of good English communication abilities can prevent the doctors from supplying the people with great medical-care (Heung, Kucukusta, & Song, 2011). Medical students have a considerable instrumental appreciation for the ESP course, particularly in developing their career, establishing interpersonal skills, building social prestige, providing academic support, and providing an opening for self-investment (Mahmoodi & Narafshan, 2020). Accordingly, there is an increasing need for effective English instruction for medical reasons in non-English speaking countries like Iran throughout the world (Milosavljević, 2008).

The virtual world requires intense and prompt attention from medical educators. The sudden rise of e-learning, a new crossbred model of education whereby teaching is undertaken remotely and on digital platforms, enabled the concept of 'learning anywhere, anytime'. The traditional pedagogical models of classroom sessions can easily be made into blended medical learning approaches where e-learning covers the theoretical and procedural training, and face-to-face training covers practical skills as required. The traditional offline learning and e-learning can go hand in hand, even after the pandemic settles becoming the new normal (Rose, 2020). As communication and learning become increasingly virtual, medical students must focus on more digital learning methods and get adapted to 'virtual' classrooms than other methods to make the most of such sessions. To help medical students manage the challenges they ever face during their academic education, understanding their English language needs is a must that should not be neglected (Faraj, 2015).

The dominant form of computer-mediated communication (CMC) in educational environments is asynchronous communication (Johnson & Aragon, 2003). It is the sort of delayed communication without simultaneous access to educational outcomes like voice/text messages and emails (Johnson, 2006). It provides a chance for the teacher to follow multiple simultaneously-occurring patterns and discussions (Hewitt, 2005). On the other hand, Synchronous communication involves immediate communication between teachers and students, usually in the form of video chats and FaceTime audio calls (Johnson, 2006). Some studies

suggested that social presence is more obvious in synchronous chat than in asynchronous discussion. Schwier and Balbar (2002) mentioned that synchronous communication works well for content that triggers natural debate or passion, but that asynchronous communication is preferred for content that requires reflection because synchronous communication does not provide the time or concentration needed to process deep ideas. Research on the second language (L2) acquisition in Iran has shown that most language learners have difficulties in mastering L2 sound patterns with the ability of a native speaker. In many Iranian English classrooms, teachers do not pay enough attention to pronunciation instruction because it includes a lot of challenges concerning their limited pronunciation knowledge or skill. Further, some teachers lack enough time in their classes to teach pronunciation (Nosratinia & Zaker, 2014). In effect, in Iran, English is regarded as a foreign language and learners do not use it out of their classes and because of the large number of students in every class teachers are not able to control the classes and check their learners' pronunciation (Nushi et al. , 2019). Accordingly, the present study is guided by the following research questions:

RQ1. What is the effect of synchronous/asynchronous computer-mediated communication on medical students' L2 pronunciation development?

RQ2. Comparing SCMC and ASCMC, which mode of communication is more effective in fostering medical students' L2 pronunciation development?

RQ3. What are medical students' reflections on synchronous/asynchronous computer-mediated communication?

Review of literature

A new form of communication, computer-mediated communication (CMC), has been generated by the worldwide proliferation of internet and software programs that allow exchanges of messages through computers. CMC is the use of networked computer systems for communicating through the transmission, storage, and retrieval of information. It's classified into synchronous and asynchronous modes, depending on the degree of a time delay between messages. The synchronous mode takes place in real-time, while asynchronous mode does not. In particular, synchronous CMC (SCMC) has attracted some features (e.g., real-time conversation, short turns, and informal discourse) shared with face-to-face communication (F2FC) in the field of second language acquisition (SLA). Claims have been made that other features of SCMC, such as visual saliency, readability of the messages, and longer processing time, may promote second language (L2) development by amplifying learners' attention to linguistic type (Smith, 2004; Warschauer, 1997).

So far, work has provided empirical evidence supporting SCMC's pedagogical advantages in terms of participation patterns (Beauvois, 1998; Warschauer, 1996), discourse efficiency (Sotillo, 2000; Warschauer, 1996), and motivation (Warschauer, 1996). Inspired by the growing consensus that a focus on form is important for L2 development in addition to a focus on meaning, work has also investigated whether SCMC interaction could provide learners with opportunities to focus on form. Findings have shown that these incentives were created mainly through meaning negotiations (NfM) (Blake, 2000; Pellettieri, 2000; Smith, 2003; Tudini, 2003). Besides, results from a longitudinal study (Payne & Whitney, 2002) indicated that focusing on shape through SCMC-based interaction can lead to more significant improvements in L2 production compared to F2F interaction. Despite these positive results, the overall effectiveness of SCMC in guiding the attention of learners to shape through interaction is difficult to determine since previous studies have used a variety of tasks (e.g., free discussion, decision making, and information gap) with little emphasis on differential effects of task types. To date, only a handful of studies (e.g., Blake 2000; Pellettieri, 2000; Smith, 2003) compared the effects of distinct types of tasks on shape concentrating through interaction. To find out which SCMC environment is

most conducive to SLA, more research is needed to compare the relative effectiveness of task types in directing the attention of learners to form.

Many SLA researchers (Doughty & Williams, 1998b; Ellis, 2001; Long, 1991) have advocated over the past few years the idea that the attention of learners should be drawn to formal aspects of language through pedagogic intervention. A large number of studies that formed the basis of a meta-analysis have provided empirical evidence for this claim (Norris & Ortega, 2000). The focus on-form perspective sets out the conditions under which the attention of the learners should be guided to form. It rejects the traditional focus on forms in which the attention of learners is drawn to form by teaching discrete language units (i.e., grammar rules, phones, notions, or functions) in an order determined by learner-external factors. It also disagrees with an exclusive emphasis on language, in which no specific attempt is made to handle type. Emphasis on form, as an alternative to both, "overtly attracts the attention of students to linguistic elements when they occur unconsciously in lessons that concentrate on meaning or communication" (Long, 1991, p. 46). The emphasis on form is inspired by the interaction hypothesis (IH) (Long, 1983a, 1996), which implies SLA is encouraged by interaction. There is a strong awareness of the role of conversational interaction in SLA (e.g., Long, 1996). In particular, conversational interaction that involves NfM, where "learners seek clarity, validation, and repetition of the L2 utterances they do not understand" (Pica, 1994a, p. 56), provides a favorable language learning environment. It gives learners understandable input, which is necessary but not appropriate to produce L2, as well as negative feedback, which improves language development by showing learners what is not permissible in the L2 (Long, 1996). In the same line, Dawson, Cavanaugh, and Ritzhaupt (2008) emphasized that by using computer technology, language class changes to an active environment enriched with meaningful tasks where the learners are responsible for their learning. The findings of this study are in line with Alibakhshi and Mohammadi (2016) and Coyle and Reverte (2017) that in online environments, learners get better results. According to Abrams (2008), CMC-based instruction helped medical students raise their awareness of L2 features, understand the micro-level patterns of speech, and adapt their language to work in such speech communities

Additionally, interaction can be of value to learners as it provides opportunities for output generation. According to Swain's (2005) output hypothesis "pushed" output can accomplish three functions. First of all, language development will allow learners to find gaps in their knowledge of L2 that can lead them to notice the gap between what they can produce and what is available in the input. Second, language production lets students test their hypotheses against target language standards. Output can thus serve as an arena in which learners expose their best guesses about the workings of the target language (Swain, 2005). Lastly, language development will lead learners to focus on the performance of themselves and their partners and to increase their metalinguistic understanding. Several studies (de la Fuente, 2002; Gass & Varonis, 1994; Mackey, 1999) have provided evidence that they contribute to contracts and acquisitions (Long, 1996). Among the other benefits of CMC are the incentives it provides for individualized learning, exposure to multiple languages, and experiences with specific L1 learners and language native speakers, making it easier to use the language to communicate authentically. SVCMC provides the opportunity to improve the speaking skills of the students and to assess whether their communicative skills and intelligibility⁴ are appropriate for effective interaction. Although text chat has been compared to face-to-face interaction and appears to share some of its benefits (Beauvois, 1997; Payne & Ross, 2005), synchronous voice exchanges should be more closely resembling face-to-face communication, particularly concerning repair moves, adjacency conventions and coherence structures for discourse (Jepson, 2005).

Studies on SVCMC has compared text and voice chat and has reported that voice chat technology makes tasks more demanding for learners (Sauro, 2001), produces significant gains in oral proficiency (Yang & Chang, 2008; Satar & Özdener, 2008), and provides environments in which learners are more willing to negotiate for meaning, use a significantly higher number of repair moves (especially pronunciation-related repair moves), and repair their speech more often based on their interlocutor's clues (Jepson, 2005). Jepson (2005) concluded that "because of the inherent absence of non-verbal communication and the focus that current voice chat technology places on pronunciation, voice chats may be an optimal environment for pronunciation work" (p. 92).

Methodology

Design of the Study

A quasi-experimental concurrent mixed methods research design (quan+qual) that included two intact classes was used in the current study. Synchronous/asynchronous computer-mediated communication was the independent variable of the current study, and L2 pronunciation development was the dependent variable of this study.

Participants

Forty-four male and female students (24 females and 20 males) of medicine at Islamic Azad university of Kerman, Iran, all native Persian speakers with normal hearing abilities, participated in this study. The researchers applied the Oxford Quick Placement Test to ensure that the participants of the present study were at almost the same level of English language proficiency. According to the results, 10 participants were upper-intermediate and 34 stood as intermediate English language learners. We started the project with intermediate learners (23 females and 11 males) and excluded the upper ones from the study. The participants were 18 to 42 years old, and they all had at least minimal exposure to computer mediated modalities.

Instruments

The present study followed a mixed methods research design using a test, and a semi structured interview.

Word Stress Test

To collect data, the participants answered the word stress test designed by Higher Education Language & Presentation Support (HELPS) containing two parts of comprehension and production. The comprehension section included two parts. For the first part, the participants listened to the words with different stress patterns, and they had to tick the answer with the correct stress. For the second part, they listened to the words with and without suffixes, and decided if the stress stays on the same syllable or move to a different syllable when the suffix is added. For the production part, they were asked to read twenty words which had different stress patterns. The production parts were recorded and later scored by four blind rates (Ph.Ds. of English linguistics), whose opinions on the participants' pronunciation skills were strongly concurrent. The inter-rater reliability for this test was 0.92 showing a strong agreement between the four raters. The test items were given to several domain experts to assess their redundancy, face validity, and content validity. To increase the validity and reliability of the items, they were also pilot tested with a population close to that in the study.

Semi- structured Interview

Besides the quantitative data, a semi-structured interview was used for the qualitative data collection. The interviews, lasting around 15 min, were conducted in Persian at the end of the

project, recorded with a digital voice recorder, and were later manually transcribed. The answers were coded to develop categories. Data analysis was conducted by the three researchers until they all agreed that no further categories could be extracted. The main interview questions were as follows:

1. How was your experience in this project?
2. What is the effect of the program on your professional life and why?
3. What do you think about the effect of this program on your academic experience?
4. Can you find any potential changes after this experience?

Instructional Materials

To follow the same tasks in both groups, the participants completed the three following tasks (the pictures and the topics were related to the field of medicine):

Picture Differences Task: In this task, participants had to spot the difference between two similar pictures. Participants had to share information about their respective pictures to complete the task. No linguistic information was provided, and learners had to agree on a specified set of differences.

Consensus Task: This task required participants to come to an agreement about the information provided to them, based on a set of criteria.

Conversation Task: To elicit more naturalistic interaction between participants, a conversation task was used in which participants asked about their partners' favorite things, in addition to describing their own. All three tasks were two-way information gap tasks to maximize negotiation; however, several other task conditions were varied.

Procedure

A comparative mixed methods research design that included two intact classes was used in the current quasi-experimental study. At first, the participants were given some instructions in Persian, and to minimize misunderstandings, two examples of each test were given to the participants. Besides, the participants were told that mistakes would be natural, and they could proceed with the test even though they were not sure of the correct answers. These students of medicine chosen as participants of the present study were enrolled in a general English semester course for medical students. The main objective of the course was the improvement of the participants' general proficiency in English language. They were randomly assigned to one of the two computer mediated modalities, resulting in 17 participants in synchronous computer mediated mode, which was conducted in the form of video chats and FaceTime audio calls, and 17 participants in asynchronous computer mediated mode, which was conducted in the form of voice/text messages and emails. Each session lasted around 60 min and the participants completed the same tasks in both groups. Different clips related to the field of medicine were presented and the participants had to discuss the information presented through the clips. Then, they had to find and report the similarities and differences between the clips. A post-test and a semi structured interview were conducted to measure the degree of improvement in each learner's English pronunciation achievement at the end of the implementation period.

Results

Observation of diversification of pronunciation achievement in pre-test and posttest showed that the pronunciation was significantly different in synchronous group in pre-test and in posttest ($p < 0.01$). The effect size was $ES = 1.76$, $r = 0.661$.

Table 1

Paired-Samples T-Test of Pronunciation Development in Synchronous Group

	Time	N	Mean	SD	T-Test	Df	P-Value
Pronunciation Development	pre-test	17	106.90	30.31	-6.98	16	.000
	post-test	17	146.20	14.34			

The results of pronunciation achievement in pre-test and posttest also showed that the pronunciation was significantly different in asynchronous group in pre-test and in posttest ($p < 0.01$). The effect size was $ES = 1.35$, $r = 0.560$.

Table 2

Paired-Samples T-Test of Pronunciation Development in Asynchronous Group

	Time	N	Mean	SD	T-Test	Df	P-Value
Pronunciation Development	pre-test	17	109	26.16	-7.09	16	.000
	post-test	17	139.10	18.35			

Using thematic analysis of the data, from a total of 34 students' responses (synchronous & asynchronous modes of communication) concerning their reflections on the project, we developed 3 main themes of: (1) engagement (2) enjoyment and (3) motivation. The following three codes were mentioned by participants of both groups. The main interview questions were as follows:

1. How was your experience in this project?
2. What is the effect of the program on your professional life and why?
3. What do you think about the effect of this program on your academic experience?
4. Can you find any potential changes after this experience?

Engagement

This category focuses on medical students' propensity for classroom engagement. The boosted sense of task participation is vivid in most responses made by participants of this study, especially the synchronous group.

I am a student of medicine and I use English in different ways with different professional purposes. Technology gave me the chance to expand my knowledge of English language especially oral aspects of language. I feel being more involved with English language.

After this program, there is a feeling of connection with all components of English language. And there is a sense of language engagement in my professional field of medicine. Thanks to technology.

Enjoyment

The following category focuses on medical students' enjoyment experienced by being exposed to online language classrooms.

Technology helped us enjoy new things about English language and I think speaking the language in a standard way is more prestigious for students of medicine.

At first, it was just a force to me, but now there is a strong sense of enjoyment in English language classrooms.

Motivation

Technology motivated the students of medicine in the language learning direction, and this has been documented from the participants' responses.

After this program, I feel a strong motivation to learn English language professionally. I think it is a must in the field of medicine.

Discussion

Medical education across the world has experienced great changes because of the COVID-19 pandemic and technology has been rapidly and innovatively used to keep teaching and learning in this field. The findings revealed the positive effect of CMC-oriented instruction on the acquisition of English pronunciation by medical students; however, the Syn. group tended to vary their pronunciation achievement more than the asynchronous group. In the same line, Dawson, Cavanaugh, and Ritzhaupt (2008) emphasized that by using computer technology, language class changes to an active environment enriched with meaningful tasks where the learners are responsible for their learning. The findings of this study are in line with Alibakhshi and Mohammadi (2016) and Coyle and Reverte (2017) that in online environments, learners get better results. According to Abrams (2008), CMC-based instruction helped medical students raise their awareness of L2 features, understand the micro-level patterns of speech, and adapt their language to work in such speech communities. Indeed, technology holds great potential for pronunciation training, particularly in terms of maximizing opportunities for practice and exposure to oral language.

The greatest development in the SCMC group suggests that performing the tasks in the synchronous learning activities makes the instructional points more salient to the student (Ene & Upton, 2018; Hoyos, 2018). According to Baron (2002), synchronous CMC shapes a process-oriented debate, with real-time messages, and helps the participants exchange their ideas, monitor their partners' reactions to the message and, if necessary, reformulate it. In this way, the learners can figure out the best solution to the given situation. As Hurd (2006) mentioned, learners may generate the language at the same time, discuss their understanding of the language with their partner, and revise their responses. However, some studies report the advantages of asynchronous CMC compared to synchronous CMC courses, including time-independent access, opportunities for heightened levels of peer interaction, avoidance of undesirable classroom behavior, and support for multiple learning styles (Morse, 2003). Drawing on qualitative analysis, results reveal that the use of computer-mediated communication contributed to medical students' involvement, enjoyment, and motivation.

In brief, the current pandemic has caused the increased awareness and adoption of currently available technologies in medical education, and in the wider education sectors (Hong et al., 2016). These changes across the field of medicine have been mainly to replace traditional approaches for the provision of medical education, driven by the urgency to implement a practical solution to the crises, with educators using familiar technology.

Conclusion

The present study offers evidence of the potential of tasks for improving L2 pronunciation, both in terms of the methods employed and of the outcomes obtained. In brief, the technology implemented in this study presented brilliant chances for education systems. It offers opportunities for English language teaching, learning, and pedagogy in the field of L2 pronunciation. Field of medicine has been affected by universal vast changing technology. In medical education, e-learning has evolved as a pedagogical strategy to introduce an active, learner-centered teaching approach. Therefore, educators are tasked with selecting and presenting suitable technology-based curricula in the field of medicine. The present study revealed that SCMC is beneficial for pronunciation involvement, enjoyment, motivation, and achievement of medical students. During Covid-19 pandemic, technology supported teachers' and learners' understanding and acquisition of new pronunciation patterns, therefore, there is a crystal-clear benefit for the inclusion of CMC pronunciation instruction for students of medicine. Considering the findings of the present study, medical experts and educators are recommended to provide the language learners with opportunities to benefit from different forms of technology in their instructional programs; moreover, they can enrich their instruction by making use of online and offline communications. Despite its strengths, there are some limitations in this study that should be taken into consideration. First, the study sample is for the typical Iranian context, which can limit the generalizability of the results to other settings. As such, it would be valuable to replicate the study in other contexts to check the results. Additional longitudinal studies are needed to study participants' dynamic attitudes.

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