Synchronous-Asynchronous Blending or Fully Real-Time Course Delivery? Implications for Distance Language Education

Fatemeh Nami (iD)

Assistant Professor of TEFL,
Amirkabir University of Technology, Tehran, Iran

Abstract

Parallel with the global outbreak of the Covid-19 disease in 2020, which widely affected the educational milieu, many institutions of higher education shifted to fully online blended and/or synchronous courses and programs. The extent to which each of these modalities (i.e. fully online blended courses versus online real-time ones) may contribute to language learners' achievement is largely unknown. Previous studies on blended learning (BL) across various disciplines, including foreign language teaching, have largely focused on courses featuring a combination of face-to-face and online sessions. This quantitative quasi-experimental study presents an attempt to compare the effectiveness of a fully online blended technical English course with a mix of online synchronous sessions and asynchronous interactive content with that of an online real-time course. The language achievement of 25 university level students attending this online blended course was compared with that of students in an online synchronous course. Drawing on independent and paired samples t-test results obtained from two sets of pre and posttests, it was observed that while both groups performed significantly better in the final language achievement test, students in the fully online synchronous course outperformed those in the blended one. The findings speak to the significance of a careful design of online blended courses in terms of session and content delivery along with the essence of increasing peer-to-peer and learner-teacher interaction opportunities to improve the effectiveness of these courses for language learners.

Keywords: Distance education, blended learning, foreign language teaching, fully online, quasi-experimental study

Corresponding author's email: f.nami@aut.ac.ir

INTRODUCTION

The sudden outbreak of the Covid-19 disease across the globe in the winter of 2020 seriously affected the educational systems of many countries forcing a transition to online forums. After decades of debate about the (in)efficacy of online education, the proponents and opponents of distance language learning suddenly found themselves in the same frontier seeking a similar goal i.e., the most productive strategies for enhancing the quality of online language learning/teaching experiences. The Iranian higher education setting is not an exception. Over the past few years, there has been a surge in the number of online language learning courses (e.g., General English or English for academic purposes) offered at Iranian universities across different grade levels and disciplines.

In line with the mainstream online education, these courses are mainly operationalized in the form of fully real-time (synchronous) sessions held in video conferencing and live streaming platforms (see Manegre & Sabiri, 2020). A less commonly known mode for online language learning/teaching is blended learning (BL) courses and programs which comprise a combination of synchronous sessions and asynchronous learning packages (see Colpaert, 2004). Unlike conventional BL, in which students attend a mix of physical face-to-face and online real-time sessions (e.g., Andujar & Nadif, 2020; Nissen & Tea, 2012; Yang, 2012), synchronous-asynchronous BL is completely web-based with a part of language instruction and practice delivered in real-time mode and a part of it presented in the form of interactive learning content that can be accessed asynchronously (Nami, 2018).

Although technology-enhanced language learning has long found its way into the foreign language teaching discipline, fully online learning modalities and their possible contribution to learners' language knowledge development are less commonly explored compared to conventional face-to-face instruction/practice (see Rubio, Thomas, & Li, 2017). While research has widely explored the potential of conventional BL for second and foreign

language knowledge and skills development in ordinary and remedial programs and courses (e.g., Yang, 2012), "our understanding of effective BL teaching practice has lagged behind implementation" (Pulham & Graham, 2018, p. 412). Additionally, research on the design and efficacy of synchronous-asynchronous BL courses and programs, when compared with other modes of online language instruction and practice, particularly in General English (GE) and technical English courses offered to non-English major students, remains largely scant (see Wang, Chen, Tai, & Zhang, 2019).

Despite the advances in content authoring technologies and learning management system (LMS) which have largely facilitated the design and development of asynchronous learning packages for language teachers and educators (e.g., Cheng et al., 2020), empirical data on the productivity of asynchronous language learning or design requirements when combined with online real-time classroom experiences is widely missing. Consistent with the surge in the number of online GE and technical English courses and in line with the growing application of educational technologies for design and development of asynchronous language learning packages to accompany these courses, exploring the design considerations and the efficacy of such blending is a research imperative. To depict a consolidated picture of the nexus between this type of BL and students' foreign language achievement, in other words, empirical studies are needed. According to Neumeier (2005), "the most important aim of a Blended Learning design is to find the most effective and efficient combination of the two modes of learning for individual learning subjects, contexts, and objectives" (p. 164).

In response to this research need, this study compares the effectiveness of an online synchronous-asynchronous blended technical English course—offered to a group of engineering-major students at a public university of technology in Tehran—with that of an online fully real-time course. More specifically, the present article reports a quasi-experimental pretest-posttest design that explores Bachelor of Science (BS), non-English major students' technical vocabulary, reading comprehension, and language structure

knowledge achievement (hereafter language knowledge achievement) after attending an online synchronous-asynchronous blended technical English course. Drawing on posttest data, their language knowledge is compared with that of the students who attended an online fully real-time technical English course. In what follows, the key terminologies, theoretical groundings, the previous research in this regard are reviewed.

LITERATURE REVIEW

Synchronous-Asynchronous Blended and Fully Real-Time Online Courses

The transition of educational institutions to the World Wide Web due to the Covid-19 spread has created a need for virtual schools, colleges, and universities featuring synchronous and/or asynchronous online teaching (SOT and/or AOT) or a blend of both. SOT is realized during real-time online sessions which replace conventional, physical, face-to-face meetings. During SOT sessions, teachers draw on live classroom features such as video and audio streaming and text chat—synchronous computer-mediated communication (SCMC)—to deliver instruction and convey their written and/or verbal messages (see Weller, 2003).

AOT, on the other hand, can encompass: instructional videos/audios, interactive content, discussion forums used for asynchronous computer-mediated communication (ACMC), online educational software and applications, and/or similar tools usually hosted in a LMS (see Murphy, Rodríguez-Manzanares, & Barbour, 2011). In asynchronous online teaching, learners use previously developed learning materials or packages and do not have real-time access to the teacher (Nami, 2018).

When blended together, AOT and SOT comprise online courses that encompass the qualities of both synchronous and asynchronous instruction and content delivery. In such courses, widely referred to as synchronous-asynchronous blended learning (BL) courses, the synchronous classroom

meetings are expected to support what Alonso et al. (2005) calls *live e-learning*. The real-time presence of the teacher and peers offers an opportunity for the on-the-spot dynamic collaboration, information sharing, reflection, and problem-posing/solving. The non-real-time or asynchronous instruction and practice portion, on the other hand, promotes *self-paced learning* as learners become responsible for executing learning (see Alonso et al., 2005).

Synchronous-asynchronous BL courses should be distinguished from the conventional forms of BL courses that commonly feature a combination of physical face-to-face classroom instruction and online practice (see Diep et al., 2017; Gooniband Shooshtari, Jalilfar, & Ahmadpour Kasgari, 2016; Yang, 2012; Xu et al., 2020). As Fresen (2018) rightly acknowledges,

> blended learning is often shown on a continuum, with the pure face-to-face (campus-based) mode at one extreme and pure distance education at the other... The combination of various aspects of the two extremes is what yields the blend, which is located somewhere along the continuum. (p. 228)

Grounded on the general conceptualization of BL as an educational course or program which draws on more than one mode of delivery (Singh & Reed, 2001) and inspired by Rossett, Douglis, and Frenzee's (2003; also Andujar & Nadif, 2020) conceptualization of BL as a mix of different media, online technologies, and learning contexts; synchronous-asynchronous BL, in this study, is operationally defined as a combination of synchronous and asynchronous online teaching modalities. Specifically, in this type of blending, students attend online real-time classroom sessions with teacher's synchronous presence and have also access to asynchronous teaching/learning packages.

Contrary to synchronous-asynchronous BL, fully real-time online courses mainly draw on the potentials of synchronous online sessions which are held in the conferencing rooms of different learning management platforms and offer synchronous multi-way interaction possibilities (i.e.,

SCMC) (see Sun, 2018). During live classroom meetings, teachers and learners have access to audio-, video-, and text-based communication tools for real-time verbal, textual, and/or multimodal exchanges. The term fully real-time online course, in the present study, is operationally defined as an online English language learning course which encompasses online synchronous sessions defined and held in a university LMS.

Online BL and Foreign Language Classrooms: Theoretical Groundings and Educational Potentials

Inspired by the tenets of connected learning theory (Ito et al., 2013), it is suggested that learning is the outcomes of learners' personal interests and peer culture. Online real-time or synchronous learning platforms situate learners in a context in which they can get engaged in problem-solving and collaborative exchanges (SCMC) and relate their learning to the knowledge they construct within such a community based on their personal interests. These environments can also facilitate learner access to peer and teacher support (i.e., peer culture).

Additionally, grounded on constructivist theories of learning, it is suggested that online asynchronous experiences and materials promote what Orton-Johnson (2009) calls 'a flexible learning environment' that supports autonomous personalized learning in a learner-centered environment (see Cheng & Chau, 2016). The ubiquity of asynchronous modality enables the language learners to enjoy learning beyond the temporal/physical confines of real-time synchronous and face-to-face classrooms. The asynchronous nature of interaction with the content, instructional materials, the teacher, and peers, independent of the spatial and temporal confines of the physical classrooms, adds a degree of flexibility to the learning environment, which can support self-paced and autonomous learning (Alonso et al., 2005; Yang, 2012).

In other words, synchronous and asynchronous online teaching (SOT and AOT) and communication (SCMC and ACMC), which can be

experienced in synchronous-asynchronous BL courses, are recognized as productive vehicles for promoting foreign language use and development. This is widely attributed to their potential in not only supporting multi-way collaboration (Abrams, 2003) but also holding other course components together like glue (Weller, 2003).

A careful review of research on online and blended language learning/teaching attempts reveals that BL, in the majority of these studies, almost unanimously, refers to a combination of face-to-face sessions with online a/synchronous activities or instructional content delivery (e.g., Andujar & Nadif, 2020; Cheng & Chau, 2016; Chen Hsieh, Wu, & Marek, 2017; Rubio, Thomas, & Li, 2017; Yang, 2012). On a smaller scale are the studies in which BL encompasses the use of educational technologies (e.g., smartphone apps) with physical or online classroom instruction (e.g., Wang et al., 2019).

Combining four hours of face-to-face instruction with three hours of online activities on a weekly basis in an English language learning course in a public Mexican university, for example, Xu et al. (2020) explored the impact of BL on students' English language learning in a large-scale four-year study. After controlling for course-level effects, Xu et al. (2020) observed that students in the blended courses were more likely to pass the courses and scored higher in the exams. The researchers concluded that BL can be considered as a cost-effective language learning strategy, specifically in developing countries.

In addition to the scarcity of empirical data on synchronous-asynchronous blended language learning/teaching in higher education settings, there appears to be an overarching reliance on self-report data in fully online and/or conventional blended learning studies (e.g., Wang et al., 2019; Yang, 2012). Drawing on interview data and students' log files and posttest results, for instance, Yang (2012) similarly reported a positive correlation between BL and learners' reading proficiency. Wang et al. (2019), similarly, restrict their focus to questionnaire data. Particularly different from the common experiences, Wang et al. (2019) designed a BL

environment drawing on a mix of a/synchronous learning, face-to-face flipped learning, mobile-based learning, and out-of-classroom project-based learning to enhance English language proficiency of 1603 university level Chinese students. Although no empirical data on students' post-treatment language knowledge is reported, the researchers noted that the participants reported a positive attitude toward English language learning in a blended mode after the completion of the course.

Additionally, while there are studies that have compared the potentials of synchronous and asynchronous learning platforms for learning different language skills (e.g., Fabriz et al., 2021; Memari, 2020), the combined use of real-time online sessions and interactive learning packages for asynchronous language instruction and practice, particularly in Iranian higher education contexts, has not been empirically explored. Memari (2020), for instance, explored the application of synchronous versus asynchronous language learning activities for grammar language knowledge development. Drawing on the analysis of variance (ANOVA) test results, obtained from two groups of EFL learners who attended grammar a grammar course at a state university in Tehran, the researcher found both synchronous and asynchronous activity types productive for grammar knowledge development. No specific information, however, is provided regarding the nature of the courses and the treatment offered or the design of such activities. This, in effect, makes it difficult to discern how each activity type might have contributed to participants' language knowledge achievement.

PURPOSE OF THE STUDY

The study reported in this paper presents my attempt to contribute to the abovementioned research base by offering a detailed look into language instruction/practice in a synchronous-asynchronous blended technical English course and the ways in which it contributed to my students' learning. In the face of the global migration to online courses and programs

during this emergency condition, the main challenge for foreign language profession is to explore the extent to which fully online modalities contribute to student learning. To shed more light on this area, this study applied a quantitative quasi-experimental (between group pre and posttest) design to address the following research questions:

1. What is the effect of language instruction/practice in a synchronous-asynchronous blended technical English course on university level students' English language achievement?

2. How effective is language instruction/practice in this type of BL in comparison to a fully real-time online technical English course?

METHOD

Participants

The study was conducted at a university of technology in Tehran. All students are required to take two compulsory English language courses during their Bachelor of Science studies: a one-credit-unit (semi-technical) English 1 and a two-credit-unit (technical) English 2 course. Two different six-unit pamphlets designed and developed by the department members are used as the instructional material in these courses. These semi/technical courses have always been held in face-to-face modes.

Students in each course usually take a 40-48 item midterm and a 50-52 item final exams. Out of a final 20-point scale, six points are assigned to the midterm, 12 points are given to the final, and two points belong to classroom participation. Students need a minimum of 10 to pass each course. The English 2 course pedagogically aims at developing students' knowledge of technical vocabularies commonly used in different sciences and engineering fields, their understanding of particular grammatical rules recurrent in academic texts, and their knowledge of reading strategies to enable them read and understand technical texts in their field of study.

Students at this university are, on average, in basic Elementary to Upper-Intermediate range of English language proficiency. Following

convenience sampling strategy, two English 2 courses, in the second academic semester of 2020, were randomly selected and assigned as the control (with 12 females and 13 males) and experimental groups (with 11 females and 14 males). Participants included a total of 50 non-English major students ($n = 25$ in each group). The control group attended fully online synchronous sessions, whereas the experimental group participated in a mix of online a/synchronous sessions. The researcher participated in the study as the course instructor.

The Technical English Course

Bachelor of Science (BS) students are required to register for two compulsory English courses at the university under the study. These include a one-credit-unit GE course (i.e., Zaban 1) and a two-credit-unit technical English course (i.e., Zaban 2). The GE course aims at enhancing non-English major students' knowledge of the pre-requisites of reading comprehension, high frequency GE vocabularies in academic texts, and basic language structure principles. The students who successfully pass the GE final exam are eligible to register for the technical English course.

The pamphlet which is applied for language instruction and practice in the technical English course focuses on more advanced reading strategies. The reading selections are related to different engineering majors and feature a range of technical jargons, highly technical words, and high frequency GE vocabularies that are commonly encountered in the texts related to sciences and engineering. Additionally, the pamphlet offers a range of vocabulary, reading comprehension, and language structure activities and exercises. The grammar instruction and practice focuses on different types of subordinations and conditional sentences as used in academic writing.

Instrumentation

To compare the control and experimental groups' achievement after the

completion of the course and explore the possible impact of course modality (as the independent variable) on participants' technical English language achievement, two online 50-item multiple-choice achievement tests were used as pre and posttests, respectively. Language achievement, in the context of the present study, is used as an umbrella term to reflect participants' demonstration of vocabulary and language structure knowledge and reading comprehension skills after the completion of the course.

Each test comprised 30 vocabulary, 12 grammar, and eight reading comprehension questions. The items addressed the content of the instructional pamphlet. The researcher selected the items from department's item bank designed for midterm and final exams. To ensure the internal validity of the items, the first draft of the tests was shared with a panel of four instructors from the department, and revisions were made based on their expert views.

To explore the internal consistent or reliability of the pre and posttests, Cronbach's Alpha was calculated for each test. Following the volunteer sampling procedure, BS level Engineering-major students from four technical English courses (different from the two main courses focused on in this study) were invited to take an online test. Notifications were sent to Nima LMS for these groups. The 118 students who volunteered to take the tests were randomly divided into two groups (each with 59 students), and the pre and posttests were administered to these two groups, separately. Cronbach Alpha estimates of .682 and .703 for the pre and posttests, respectively, demonstrate acceptable levels of internal consistency. A careful analysis of the estimates in Cronbach's Alpha if Item Deleted column of Item-Total Statistics table in SPSS output revealed that the removal of any item from the two sets of tests would result in a lower Cronbach's Alpha. Therefore, no item was deleted from the pre and posttests.

Afterwards, three separate sections were defined in the Question-Bank of the LMS for vocabulary, reading, and grammar question and the finalized items were uploaded in related sections. To decrease the cheating possibility

and increase the trustworthiness of the results, the items were set to be randomly selected from the question-bank and the options were set to be shuffled for each item. This way, each test taker viewed a different order of items and options. Additionally, every two items were presented on one page and the navigation method was set as *sequential* to avoid participants from moving back to previously answered questions. Participants were informed about this layout feature beforehand. A note of *commitment to the ethics of online exams* (in Persian) was added as the first question of the test. While it required no response, students were informed that clicking on the 'Next' button to start the test would be an indication of their adherence to the points highlighted in the commitment.

Data Collection Procedure

The study took place over a four-and-a-half month period with students attending a two-hour classroom session each week for 16 consecutive weeks. The winter academic semester began on 8 February, 2020. Two face-to-face sessions were held for each course prior to the outbreak of Covid-19 disease about the end of February which forced the university to transfer its educational activities to the online forums from the beginning of March 2020. The instructors were free to choose the mode of delivery for their courses (i.e., online synchronous or blended synchronous-asynchronous sessions). During the first two weeks of March, most of the instructors were optimistic about the possibility of going back to the normal situation within a few weeks. Therefore, the majority of classes were postponed. In the meantime, the researcher was inspired by the idea of conducting this research and found an opportunity to reflect on its design, develop the online pre and posttests, and pilot-test the early versions of the two tests by administering them two volunteer students.

The surge in virus spread during mid-March, however, offered the academic staff a more realistic vision about this emergency situation. Hence, the educational activities and online classes started to be held from the third

week of March. The students were informed that face-to-face physical education was no longer possible and the remaining sessions would be held online.
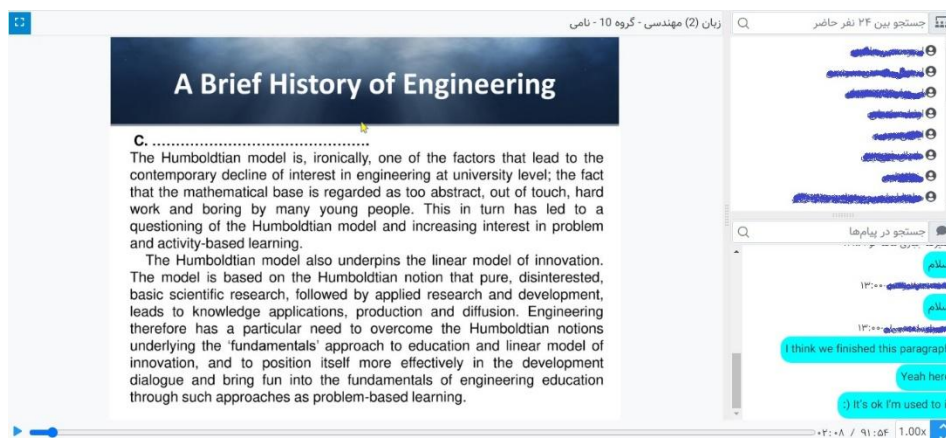

Figure 1: A Screenshot of Live Classroom Interface Held in Nima LMS

This university uses two complementary LMSs. Both include student and teacher interfaces and the student tracking feature. *Nima* LMS uses Persian as the default language and is mainly applied for defining and holding online synchronous sessions (see Figure 1) and sending notifications about the time and dates of online sessions, exams, and the asynchronous content/sessions. The system monitors students' live session attendance, and reports are available for download after each session in the Excel File format. Although it encompasses content sharing feature, the instructors are recommended to use the *Courses* system for interactive content design and display, online test design and administration, sharable content object reference model (SCORM) output display, and asynchronous discussions. Unlike Nima, Courses supports both Persian and English as the default language.

Prior to the beginning of the online courses, the instructor uploaded the finalized version of the pretest in Courses LMS for the experimental and control groups. Notifications were sent to all of the students across the two

groups in Nima LMS, informing them on its purpose and inviting them to take the test. The pretest was scheduled for the first weekday of the third week of March. The online sessions of the control and experimental groups were resumed on the same week.

The control group attended fourteen 90-minute online synchronous sessions in Nima LMS, whereas the experimental group had nine 90-minute online synchronous and five asynchronous sessions (each after one or two synchronous sessions) in Nima and Courses, respectively. The students in both groups used the six-unit pamphlet for English 2 as the course material. Each unit in this pamphlet features a pre-reading strategy followed by a 700- to 750-word passage, post-reading comprehension questions, vocabulary practice section, and grammar focus and questions. The grammatical rules are taught deductively and are usually followed by classroom discussions and review of sample sentences featuring in/appropriate use of the rules.

The passages were selected for inclusion in the pamphlet from different authentic, engineering-related resources by a panel of five GE, English for Academic Purposes (EAP), and technical English experts with an average teaching experience of seven years. Inspired by the Schemata Theory, four criteria were considered for selecting relevant texts. These included: language, content, form, and strategy (Du, 2016). According to the language schema, relevant technical English reading selections feature a sound combination of general English and highly difficult academic words of the disciplines. In the case of the present study, each passage included a range of 15-20 highly technical words recurring in different fields of engineering, 3-5 jargons (specific to a particular engineering discipline), and 30-35 general English words with high frequency in technical texts.

Content schema related to the relevance or suitability of the content for target language learners. Accordingly, the topics which were selected for inclusion (i.e., a brief history of engineering, energy engineering, bioengineering, electrical engineering, textile engineering, and earthquake detection and protection) reflected the main engineering majors offered at the university under the study. The form schema encompasses the length,

style (e.g., reports, articles, academic speech), and the structure of the texts. The strategy schema highlights the essence for a relevant technical English reading selection to feature both the context and the usage of the language to "effectively cultivate the pragmatic ability of students" (Du, 2016, p. 52).

The first face-to-face session in both groups was dedicated to the introduction to the course and its specification. Students were asked to take a look at the reading passages beforehand to prepare for classroom reading and discussions on the content of the texts. During the second face-to-face session, the first reading passage was worked on. Each paragraph was read by one of the students on a voluntary basis. This was followed by discussions on the content of the paragraph read and different vocabulary items. The instructor used different questions to engage students in in-class reflection on the instructional content and speaking. The reading selection of unit one in the pamphlet was completely read and worked on for both groups before the shifting to the online mode.

Control group

A similar strategy was followed for working on the reading selections during the online synchronous sessions of the control group except for that few students volunteered to read the paragraphs using their microphones and the instructor had to read a number of paragraphs herself. Video streaming feature was not used during live sessions to avoid possible connectivity problems for the students who were using slower Internet connections. The instructor used her microphone and invited students to participate in classroom discussions in audio-based mode. However, the majority preferred to use the text-chat box for commenting and discussing during live classroom meetings.

The reading passage was uploaded in the form of a PowerPoint Presentation (PPP) with one or two paragraphs per slide (Figure 1). The instructor used the marker feature to highlight and/or underline words or text chunks in the slides. Important points were pinned in the notepad window right above the text-chat box. The sessions were automatically

recorded and available for download. By installing VCDesktop app or software, students were able to easily re-watch the recorded sessions at their convenience.

It usually took one session to work on each reading selection. The following one or two sessions were dedicated to post-reading comprehension and vocabulary exercises and discussion on the grammar focus of the unit with related exercises. Students were asked to work on the exercises beforehand to better understand the points when each item was checked during the classroom meetings. Exercises were similarly uploaded in PowerPoint slides and students were invited to share their responses using the text-chat box. This usually encouraged students to ask their questions and engaged them in discussions on the correct responses.

Experimental group

For effective BL design, according to Stracke (2009), the asynchronous instruction and practice should complete the synchronous ones. Hence, contrary to mainstream BL research in which students receive instruction during face-to-face meetings and practice language learning online, both a/synchronous sessions were used for instruction and practice in this study. Each asynchronous session was scheduled in-between one or two synchronous sessions. While the real-time sessions were to be attended by all students at the same time and date on a weekly basis, to address the flexibility feature in BL (see Stracke, 2009), the asynchronous sessions could be attended throughout the week at the time each individual found convenient.

Each asynchronous session in the experimental group can be elaborated as an interactive instructional SCORM file created by the instructor using Articulate Storyline3 software. The focus of each file was on one of the reading selections of the pamphlet. Upon clicking on 'Start the Session' button, the student was directed to the first slide which contained instructor's audio-based explanation of the reading strategy of that particular unit. The content of the slide was animated in a way that the points and

sentences appeared on screen and were highlighted in alignment with instructor's audio. By clicking on the 'Next' button, a slide was loaded containing a reading strategy exercise. The interactive nature of the material enabled the student to receive automated text-based feedback upon submitting in/correct responses.

The slides that followed were dedicated to the reading selection. To replicate the control group's classroom instruction and practice of the reading passages, each slide featured one paragraph and instructor's audio, reading it and at the same time highlighting and explaining important points. As indicated in Figure 4, the main vocabularies were underlined and a dictionary or image icon was pinned above each. By clicking on the yellow image icon, students could see the picture of the work (when applicable) in a small pop-out box. By keeping their cursor on the blue dictionary buttons, a cloud popped out containing English and sometimes Persian equivalents for the selected word. The instructor made sure to address the same topics, concepts, and words as those worked on during the live sessions for the control group, when reviewing each paragraph. Each slide could be watched unlimited times using the *Seek Bar* feature (see Figure 2).
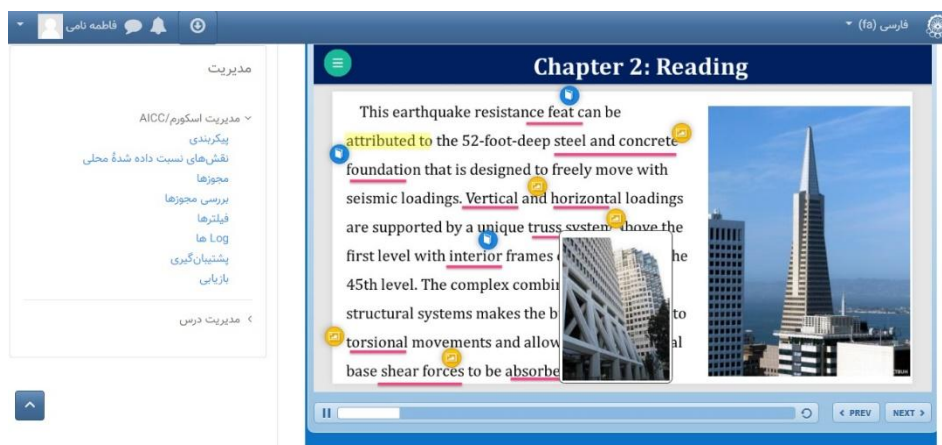

Figure 2: A Screenshot of Asynchronous Session

It took between 90 to 120 minutes for each student to watch and work with the entire audio-enhanced interactive slides in each of the SCROM files. Design features of the files prevented the students from skipping the slides without watching them. A built-in quality of the LMS enabled the instructor to monitor students' attendance by offering a comprehensive report on the amount of time users spent on each slide and their overall score. The LMS marked student attempts as 'complete' only if they watched all of the slides, submitted the required responses, and clicked on 'Exit the Course' button at the end of the session. Although the files were available even after the due weeks, students' who missed to watch and use the content within the scheduled week were considered absent. Similar to the control group, reading instruction was followed by one or two online synchronous sessions dedicated to post-reading comprehension, vocabulary, and grammar exercises. The deductive instruction of grammatical rules was also preserved for these real-time sessions.

Data Analysis

In the first phase of analysis, an independent sample t-test was adopted on the pretest results to explore between-group homogeneity at the onset of the study. During the second phase, two sets of paired sample t-tests were carried out on the pre- and post-tests of the control and experimental groups, respectively, to address the first research question on the effectiveness of the online synchronous and BL treatments. The result of a second independent sample t-test conducted on the posttest was applied to explore the possible difference in the language achievement of the students who attended an online blended course with that of the students in an online synchronous course. All the analyses were conducted using SPSS software (version 18).

Assumption testing was carried out for the independent t-tests prior to the analyses which included random selection of participants, normal distribution of the ratio or interval data, and homogeneity of variance. The first assumption was met as the two groups were randomly selected from six

groups of English 2 courses. A *p*>.05 of Shapiro-Wilk test for the control and experimental groups (.912 and .914 respectively) confirmed the normality of distribution in the data. Finally, since all p-values in Levene's Test of Equality of Variances were more than .05 (see Tables 1 and 4), the variance of the independent samples t-tests can be assumed to be homogeneous. Hence, independent samples t-test analysis was applicable for the data in this study. Paired samples t-test is applicable to two variables which are independent or continuous and the difference scores between them are normally distributed. As discussed above, both assumptions were met in the data in this study.

Table 1: Independent samples t-test results for the pre-test

		Levene's Test for Equality of Variances		t-test for Equality of Means							
		F	**Sig.**	**T**	**df**	**Sig. (2-tailed)**	**MD**	**SED**	**95% Confidence Interval of the Difference**		
									Lower	**Upper**	
Pretests	EVA	.014	.907	-.765	48	.488	-1.960	2.563	-7.113	3.193	
	EVNA			-.765	47.873	.448	-1.960	2.563	-7.113	3.193	

EVA = Equal Variance Assumed

EVNA = Equal Variance Not Assumed

MD = Mean Difference

SED = Std. Error Difference

RESULTS

The average score out of a total of 50 for the control group (Mean = 23.03) was slightly higher than that of the experimental group (Mean = 21.04) in the pretest (see Table 2). However, the result of an independent samples t-test on pretest scores (Table 1) revealed no significant difference between the performance of the two groups (*t* = .765, *p* = .907), suggesting that the participants across the two groups were almost homogenous at the onset of

the study.

Table 2: Paired samples statistics

Groups		Mean	N	Std. Deviation	Std. Error Mean
Synchronous	Pretest	23.08	25	9.291	1.858
	Posttest	41.60	25	4.950	.990
Blended	Pretest	21.04	25	8.768	1.754
	Posttest	38.32	25	4.413	.883

Research Question One

The results of the two paired samples t-tests conducted separately on the pre- and post-tests of the two groups (Table 3) showed significantly higher mean scores in the posttests $t(24) = 9.202$, $p = .000$ (control) and $t(24) = 10.075$, $p = .000$ (experimental), implying the effectiveness of the treatments across the two groups. The average posttest mean score of the students attending the online synchronous course sharply rose to 41.60 out of a total of 50. A significant growth was observed in the mean score ($M = 38.32$) of the posttest results obtained from the students in the blended course (Table 2).

Table 3: The results of paired samples tests

		Paired Differences					t	df	Sig. (2-tailed)
		M.	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Synchronous	**Pretest – Posttest**	-18.520	10.063	2.013	-22.674	-14.366	-9.202	24	.000
Blended	**Pretest - Posttest**	-17.280	8.576	1.715	-20.820	-13.740	-10.075	24	.000

Research Question Two

To explore whether the students in the blended course performed differently

from those in the online asynchronous course, the results of the independent samples t-tests conducted on the posttests were applied. As indicated in the first row of Table 4, $t(24) = 2.473$, $p = .017$., a mean difference of 3.280 is 2.4 times larger than a standard deviation of 1.326, highlighting a significant difference in the performance of the students across the two groups in the language achievement posttest. Considering the average mean scores of the posttests (Table 2), it can be argued that the control group outperformed the experimental group. In other words, attending live sessions all through the course appeared more productive than blending the online live sessions with asynchronous instruction and practice. On average, students in the blended course scored three points lower in the final exam compared to those in the online synchronous course.

Table 4: Independent samples t-tests

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	MD	SED	95% Confidence Interval of Difference	
									L.	U.
Overall posttest	EVA	.215	.645	-2.473	48	.017	-3.280	1.326	-5.947	-.613
	EVNA			-2.473	47.382	.017	-3.280	1.326	-5.948	-.612
Posttest Vocabulary	EVA	1.981	.166	-.275	48	.784	-.200	.727	-1.662	1.262
	EVNA			-.275	43.209	.785	-.200	.727	-1.666	1.266
Posttest Grammar	EVA	.157	.694	-3.127	48	.003	-.920	.294	-1.511	-.329
	EVNA			-3.127	46.009	.003	-.920	.294	-1.512	-.328
Posttest Reading	EVA	.199	.657	-3.524	48	.001	-2.160	.613	-3.392	-.928
	EVNA			-3.524	47.917	.001	-2.160	.613	-3.392	-.928

L. = Lower; U. = Upper

To spot the exact areas of difference in posttest results, the independent samples t-test was repeated for each section in the posttest (i.e., vocabulary, grammar, and reading comprehension). As indicated in Table 4, while there was no significant difference in the performance of the students across the two groups on the vocabulary questions, the control group students performed significantly better in the grammar ($t(24) = 3.127$, $p = .003$) and reading comprehension sections ($t(24) = 3.524$, $p = .001$). More specifically, the mean difference of the grammar section results was .920, 3.1 times greater than a standard deviation of .294. Similarly, the mean difference of the reading comprehension results (2.160) was 3.5 times higher than a standard deviation of .613.

DISCUSSION

This study set out to explore the effectiveness of a synchronous-asynchronous blended course for foreign language instruction and practice compared to an online fully real-time treatment. The results revealed that while both groups performed significantly better in the final English language exam compared to the pretest, the students attending the online synchronous course scored significantly higher in the posttest. This is consistent with Memari (2020) who found synchronous and asynchronous language learning activities, namely grammar practice, productive for developing language learners' knowledge of English language structure (also Wang et al., 2019; Xu et al., 2020).

Previous body of research has, by and large, restricted its focus to offering positive accounts of the contribution of online language learning (i.e., synchronous versus asynchronous) to language knowledge development in general (e.g., Wang et al., 2019; Xu et al., 2020) or enhancement of different language skills (e.g., Memari, 2020). Moving beyond a mere report of the effectiveness of specific treatments, the findings obtained from this study also shed some light on the way each pedagogical approach (i.e., synchronous-asynchronous blended and fully real-time)

contribute to non-English major students' knowledge of language structure, reading comprehension, and vocabulary.

Contrary to Yang (2012), it was observed that the students who practiced reading during fully online synchronous classes demonstrated better performance in the reading section of their final achievement text compared to those who received asynchronous instruction and practice on reading. Additionally, while technical grammar was taught deductively to both groups during live classroom meetings, the synchronous group scored higher in grammar section of the posttest compared to the blended one.

The inconsistency of the findings in this study with previous research on BL may be attributed to the design of the blended course as a causative determining factor. Students in the synchronous and blended courses attended each real-time session at a specific time on a weekly basis. This provided them with a six-day period prior to the upcoming session to reflect on the instructional content, practice for the future sessions, and even re-watch the session recordings. The asynchronous sessions, on the contrary, could be watched, attended to, and practiced at the time each student found convenient throughout the week.

A review of the participation logs of asynchronous sessions in the blended course reveals that most of the students watched and used the content at the weekends, and they rarely revisited the previously watched and practiced content. And since the real-time sessions were set for the first half of the week, these students might have had less time learning and internalizing the information. Consequently, a part of the live sessions following the asynchronous ones was usually dedicated to a review of what was already covered in these offline interactive files. At a pedagogical level, this might have limited the live-session practice time for the blended course. Hence, while grammar was instructed and practiced during synchronous meetings in both courses, less time might have been spent on it for the students in the BL course.

Furthermore, on average 22.2 of the students out of a total of 25 attended nine online real-time sessions in the blended course in the present

study. This rate was 19.2 for continuity in attending to five asynchronous sessions, implying that students demonstrated more continuity in attending the live sessions compared to the asynchronous ones. This is consistent with Rubio et al. (2017) who found a strong correlation between students' final grades and continuity variable for blended course participation.

Additionally, in line with constructivist theories of learning, it is suggested that learning in the online forum is largely affected by interactions among students/teacher through which knowledge is constructed (Pallof & Pratt, 1999; see also Nasri, Shafiee, & Sepehri, 2021). Contrary to on-the-spot feedback generation/reception and interaction opportunities available during the live sessions, students had to use a discussion forum in Courses LMS to pose their possible questions. Almost all of the students in the BL course, however, preferred to wait and directly ask their questions during the synchronous sessions from the instructor.

Similar to the context depicted by Wang et al. (2019) about Chinese EFL learners at higher education contexts, Iranian EFL learners in universities can be divided into two groups: one group with prior language learning experiences at private language institutes and the second group for whom English language learning is confined to the very limited classroom time of university English courses in a usually non-participatory, teacher-centered learning environment. This is not limited to English language instruction and such a conventional 'transmissive pedagogy', in Liu et al.'s terms (2017), is the dominant approach in most of courses and programs at Iranian higher education contexts. As Nami (2020) acknowledges, "Iranian students at different grade levels are mostly accustomed to teacher-centered modes of instruction in which knowledge is transmitted to the learner directly through teaching" (p. 91). Hence, they might better benefit from face-to-face and/or online synchronous sessions with teacher's real-time presence than synchronous ones.

The fact that students in the fully online synchronous course had access to the real-time teaching presence through all sessions might have better enhanced the productivity of students' language learning experiences

compared to the BL course. As Rubio, Thomas, and Li (2017) note, *strong teaching* presence, encompassing learner-content, -learner, and -teacher interaction (Moore, 1989), is deemed essential in online and distance learning contexts. While real-time sessions roughly satisfy this need, asynchronous instructional content and practice, be it interactive or not, aim at promoting self-paced learning through learner-digital content interaction and asynchronous teacher/peer feedback. In absence of synchronous teacher-learner and learner-learner interaction, it can be argued that teaching presence is only partially realized.

Hence, Yang's (2012) claim that online reading activities blended into real-time classroom meetings help learners develop a control over their reading by giving them an opportunity to read at their own pace beyond temporal confines of the physical classrooms is largely context-specific and might vary from one individual and learning context to another.

Consistent with Ellis and Bliuc (2016), in other words, it is suggested that just because learners across different cohorts receive the same instruction and are engaged in similar activities and practices does not necessarily imply that they would demonstrate the same level of learning and achievement. Rather, student achievement is expected to vary due to factors such as the dominant teaching/learning culture, the learning context, personal factors, learning styles, BL design, synchronous-asynchronous session mix and distribution, technology user-friendliness, and student tracking strategies.

CONCLUSION AND IMPLICATIONS

The study reported in the present paper aimed at comparing the effectiveness of fully online blended and real-time course delivery for language education. It was observed that students attending the fully online real-time classroom sessions significantly outperformed their peers in the blended course comprised of asynchronous interactive content and online real-time sessions. This finding highlights the key role that the learning

culture plays in the efficacy of any instructional approach. It can be concluded that, in learning contexts in which students are accustomed to or prefer teacher-centered direct classroom instruction, more student-directed personal learning approaches might not be as productive as it is generally anticipated. To address this issue, ample preparation time needs to be dedicated to have learners develop an understanding of self-directed learning.

The findings offer a number of implications for online language education researchers, instructors, and course designers. The above observations speak to the essence of a careful design of online BL courses with sound reflection and practice time preserved between the synchronous-asynchronous sessions and opportunities for more interaction with peers and the instructor, particularly during asynchronous sessions. None of the participants in this study had auditory and physical disabilities. However, larger populations may include students with these problems. Hence, the special needs of this group of students must also be considered in designing the asynchronous content to develop a more inclusive instructional materials and learning platforms.

These findings were obtained from a blended course in which about one third of the instructional content and practice was asynchronous and the rest was realized during synchronous sessions. Although "switching to BL is a complex enterprise that goes far beyond getting the mix right" (Mendieta & Barkhuizen, 2020, p. 192), to gain a more consolidated picture of which portions of synchronous-asynchronous instruction/practice work the best for language knowledge development, in line with Dudeney and Hockly (2007), it is recommended to explore the impact of other types of synchronous-asynchronous portioning of online blended courses on language achievement of the learners. Exploring the essential competencies for fully-online BL practices is another suggested area of exploration (see Pulham & Graham, 2018). Future studies should also explore the contribution of voluntary non-use of the asynchronous content and/or their voluntary non-attendance to BL to the effectiveness of a blended language course and the

possible reasons underlying such an attitude (Orton-Johnson, 2009). Self-report data, focus group interviews, and instructor observations of learner experiences can be productive for satisfying this need.

This study has some limitations that should be acknowledged when interpreting the results. In addition to the small scale of the study, the particular design of the BL course might have impacted the generalizability of findings. While the two groups appeared homogenous in terms of English language proficiency at the onset of the study, their learning motivation, technological knowledge, and self-efficacy beliefs were not controlled. These together with some other unobserved learner and context-specific characteristics might have been the source of potential bias in the findings. In line with Stracke (2009), it is suggested that "students need time to adapt to and develop in a new teaching and learning environment" (p. 7). Students in this BL course experienced only five asynchronous sessions. Longitudinal studies with an extended instruction and practice time in synchronous-asynchronous modes are crucial to gain an understanding of the adjustment time needed for students with different learning styles and strategies to adapt to an online BL design.

In sum, in line with Lukenchuk (2016), it is suggested that students experience different types of interaction, presence, and learning in online and blended mode compared to the physical learning settings. In other words, BL encompasses a change in learners' roles and responsibilities which many students might find difficult to address and regulate, especially when it is their first experience of attending an online BL course. This shift may create a dissonance between the learning expectations of the students and a totally new learning reality and consequently yield a direct impact on students' participation, attention to the content, and learning. Hence, it is concluded that effective online BL requires both learners and instructors to get adapted to the new learning environment and its particular requirement.

Disclosure statement

No potential conflict of interest was reported by the authors.

ORCID

Fatemeh Nami   (iD)   https://www.orcid.org/0000-0003-4509-3485

References

Abrams, Z. I. (2003). The effect of synchronous and asynchronous CMC on oral performance in German. *The Modern Language Journal, 87*(2), 157–167.

Alonso, F., López, G., Manrique, D., & Viñes, J. M. (2005). An instructional model for web-based e-learning education with a blended learning process approach. *British Journal of Educational Technology*, *36*(2), 217–235.

Andujar, A., & Nadif, F. Z. (2020). Evaluating an inclusive blended learning environment in EFL: a flipped approach. *Computer Assisted Language Learning*, 1–30.

Benson, V., & Anderson, D. (2010). Towards a strategic approach to the introduction of blended learning: Challenges faced and lessons learned. *British Journal of Educational Technology*, *41*(6), E129–E131.

Bown, A. N. (2018). Supporting online L2 academic reading comprehension with computer-mediated synchronous discussion and elaborative feedback. *The Reading Matrix*, *18*(1), 41–63.

Chen Hsieh, J. S., Wu, W. C. V., & Marek, M. W. (2017). Using the flipped classroom to enhance EFL learning. *Computer Assisted Language Learning, 30*(1-2), 1–21.

Cheng, Y. W., Wang, Y., Yang, Y. F., Yang, Z. K., & Chen, N. S. (2020). Designing an authoring system of robots and IoT-based toys for EFL teaching and learning. *Computer Assisted Language Learning*, *34*(1–2), 6–34.

Cheng, G., & Chau, J. (2016). Exploring the relationships between learning styles, online participation, learning achievement and course satisfaction: An empirical study of a blended learning course. *British Journal of Educational*

Technology, *47*(2), 257–278.

Colpaert, J. (2004). *Design of online interactive language courseware: conceptualization, specification and prototyping: research into the impact of linguistic-didactic functionality on software architecture* (unpublished PhD dissertation). Antwerp University.

Diep, A. N., Zhu, C., Struyven, K., & Blieck, Y. (2017). Who or what contributes to student satisfaction in different blended learning modalities? *British Journal of Educational Technology*, *48*(2), 473–489.

Du, X. (2016, January). Analysis on the EAP reading text materials based on Schema Theory. In *2016 2nd International Conference on Education Technology, Management and Humanities Science* (pp. 50–53). Atlantis Press.

Dudeney, G. & Hockly, N. (2007). *How to teach English with technology.* London: Pearson Longman.

Ellis, R. A., & Bliuc, A. M. (2016). An exploration into first-year university students' approaches to inquiry and online learning technologies in blended environments. *British Journal of Educational Technology*, *47*(5), 970–980.

Fresen, J. W. (2018). Embracing distance education in a blended learning model: Challenges and prospects. *Distance Education*, *39*(2), 224–240.

Gooniband Shooshtari, Z., Jalilfar, A., & Ahmadpour Kasgari, Z. (2016). Learning Styles and the Writing Process in a Digitally Blended Environment: Revising, Switching, and Pausing Behaviors in Focus. *Issues in Language Teaching, 5*(1), 82–51.

Ito, M., Gutierrez, K., Livingstone, S., Penuel, B., Rhodes, J., & Salen, K. (2013). *Connected learning: An agenda for research and design*. Irvine: The Digital Media and Learning Research Hub.

Liu, H. X., Lin, C.-H., & Zhang, D. B. (2017). Pedagogical beliefs and attitudes toward information and communication technology: A survey of teachers of English as a foreign language in China. *Computer Assisted Language Learning, 30*(8), 745–765.

Lukenchuk, A. (2016). Themes at the intersections of theory and practice in online and blended education. *Distance Education*, *37*(1), 130–136.

Manegre, M., & Sabiri, K. A. (2020). Online language learning using virtual classrooms: an analysis of teacher perceptions. *Computer Assisted Language Learning*, 1–16.

Memari, M. (2020). Synchronous and Asynchronous Electronic Learning and EFL Learners' Learning of Grammar. *Iranian Journal of Applied Language Studies*, *12*(2), 89–114.

Mendieta, J., & Barkhuizen, G. (2020). Blended language learning in the Colombian context: A narrative inquiry of teacher ownership of curriculum change. *Computer Assisted Language Learning*, *33*(3), 176–196.

Moore, M. (1989). Editorial: Three types of interaction. *The American Journal of Distance Education, 3*(2), 1–7.

Murphy, E., Rodríguez-Manzanares, M. A., & Barbour, M. (2011). Asynchronous and synchronous online teaching: Perspectives of Canadian high school distance education teachers. *British Journal of Educational Technology*, *42*(4), 583–591.

Nami, F. (2020). Educational smartphone apps for language learning in higher education: Students' choices and perceptions. *Australasian Journal of Educational Technology*, *36*(4), 82–95.

Nami, F. (2018). Anytime anyplace language learning via asynchronous interactive content: Challenges and implications for CALL course design. In P. Colpaert, A. Aerts, & F. Cornillie (Eds.), *CALL your data* (pp. 286-291). Antwerp University Press.

Nasri, M., Shafiee, S., & Sepehri, M. (2021). An Investigation of Iranian Intermediate EFL Learners' L2 Motivation and Attitude in a Computer-Assisted Language Learning Environment. *Issues in Language Teaching, 10*(1), 355–389.

Nissen, E., & Tea, E. (2012). Going blended: new challenges for second generation L2 tutors. *Computer Assisted Language Learning*, *25*(2), 145–163.

Neumeier, P. (2005). A closer look at blended learning: Parameters for designing a blended learning environment for language teaching and learning. *ReCALL, 17*, 163–178.

Orton-Johnson, K. (2009). 'I've stuck to the path I'm afraid': exploring student non-use of blended learning. *British Journal of Educational Technology*, *40*(5), 837–847.

Palloff, R. & Pratt, K. (1999). *Building learning communities in cyberspace: Effective strategies for online classroom*. San Francisco, CA: Jossey-Bass.

Pulham, E., & Graham, C. R. (2018). Comparing K-12 online and blended teaching competencies: a literature review. *Distance Education*, *39*(3), 411–432.

Rossett, A., Douglis, F., & Frazee, R. V. (2003). Strategies for building blended learning. *Learning Circuits*, *4*(7), 1–8.

Rubio, F., Thomas, J. M., & Li, Q. (2018). The role of teaching presence and student participation in Spanish blended courses. *Computer Assisted Language Learning*, *31*(3), 226–250.

Singh, H., & Reed, C. (2001). *A white paper: Achieving success with blended learning*. Los Angeles, CA: Centra Software.

Stracke, E. (2009). Spotlight on blended language learning: A frontier beyond learner autonomy and computer assisted language learning. In *ILA (Independent Learning Association) Japan 2007 Conference* (pp. 1-13). Association for Academic Language and Learning.

Sun, S. Y. (2018). Student configuration and place-making in fully online language learning. *Computer Assisted Language Learning*, *31*(8), 932–959.

Wang, N., Chen, J., Tai, M., & Zhang, J. (2019). Blended learning for Chinese university EFL learners: Learning environment and learner perceptions. *Computer Assisted Language Learning*, 1–27.

Weller, M. (2003). *Delivering learning on the net: The why, what and how of online education*. Routledge.

Xu, D., Glick, D., Rodriguez, F., Cung, B., Li, Q., & Warschauer, M. (2020). Does blended instruction enhance English language learning in developing countries? Evidence from Mexico. *British Journal of Educational Technology*, *51*(1), 211–227.

Yang, Y. F. (2012). Blended learning for college students with English reading difficulties. *Computer Assisted Language Learning*, *25*(5), 393–410.