

Blended Learning in the Development of EFL Productive Skills: Implementing Web-based Activities in High School Setting

Research Article

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Abstract

Blended learning is sometimes called the best of both worlds, as it combines the advantages of online learning with traditional face to face (FTF) instruction. The present study examines the impact of blended learning (BL) on the lexical variety (LV), lexical density (LD), and syntactic complexity (SC) of Iranian high school EFL students' speaking and writing skills over a nine-month period. Two groups of 42 homogeneous high school students were selected. One group was assigned as the blended and the other as the FTF group using the *Top Notch Placement Test*. Then,

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a website was designed as a platform for the BL group's online activities and tasks, such as chat room discussions, synchronous and asynchronous forums for writing and speaking activities, and an online task-completion activity. The FTF group received equal but different treatment. Interviews and a writing task were administered at the beginning and the end of the nine-month academic year in order to elicit speaking and writing samples from the students. Finally, the corpora obtained from the first and final interviews and writing tasks were analyzed by two independent coders to observe possible changes in linguistic features. A one-way ANOVA test was used to find out any meaningful differences between the indices of linguistic features in the two corpora. The results show that BL instruction exerted a positive effect on lexical variety and density both in terms of speaking and writing. However, the syntactic complexity of speaking and writing were significant for the FTF group. Hence, based on the obtained results, the superiority of BL instruction over FTF was revealed when the focus of attention was on productive skills.

Keywords: blended learning (BL), face to face (FTF) instruction, lexical density (LD), lexical variety (LV), syntactic complexity (SC)

Introduction

Recently, the power of computer-assisted language learning (CALL) has been expanded due to the nature of the World Wide Web by providing learners with the ability to discover, explore, and access online databases of resources. Meanwhile, teachers can integrate web resources into classrooms through a myriad of hyper linked multimedia documents (Ngo, 2018; Son, 2008). This integration can be realized in the form of BL instruction. BL refers to “a formal educational program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace; and at least in part in a supervised brick and mortar location away from home; and the modalities along each student's learning path within a course or subject are connected to provide an integrated learning experience” (Christensen et al., 2013; Watson et al., 2013, p.9). This language program combines a FTF classroom component with the appropriate use of technology (Graham, 2006). Technology encompasses various terms, such as the Internet, websites, CD-ROMS, and interactive message boards. It also includes environments suitable for language learning. For example, web-based language learning (WBLL) uses websites and web materials to enrich the learning environment (Son, 2008). Many studies have investigated the effect of web-based instruction on language learning (Ngo, 2018; Smith, 2003; Son, 2008). However, by using technology in language instruction, the role of FTF instruction should not be ignored. Hence, this issue intensifies the significance of adopting a BL approach to maintain technology and FTF instruction with an optimal blend in classrooms.

Several studies have investigated the effects of blended learning instruction on different aspects of language learning in universities and institutions within ESL and EFL contexts (Danielson, 2018; Gilbert, 2013; Graham, 2013; Hamilton,

2018; Layton, 2017; Murray, 2019; Thorne, 2003; Tosun, 2015). However, the main focus of the present study is to investigate the development of the speaking and listening skills of first-grade high school students through the implementation of BL instruction and traces the development in terms of lexical variety and density and syntactic complexity as the main linguistic features (Hiro-tani, 2013; Housen & Kuiken, 2009; Tavakoli & Foster, 2011).

Literature Review

Theoretical Background of BL

The educational philosophy behind online learning was chiefly based on social constructivism, which stimulates cooperation among students and teachers. Based on the work of Lev Vygotsky, the theory of constructivism is an account of how learners attain knowledge through experiences (Popp, 2017). "With constructivist teaching methodology, students construct knowledge through social interactions with more capable peers or adults rather than simply receiving and memorizing information from an instructor presentation" (Deulen, 2013, p.93). In other words, different students have different ways of making sense of what they experience (Popp, 2017). Hence, the realization of constructivism through BL can be explained as engagement in online and FTF learning to build new knowledge.

BL attempts to combine the best aspects of online and FTF learning since it benefits from the instructional skills of a traditional classroom teacher and the flexibility and resources that online learning provides (Watson et al., 2013). BL is defined as "learning experiences that combine FTF and online instruction" (Graham, 2013, p. 335). Owing to the opportunities that BL presents, it can be of great benefit to students with busy schedules (Brooke, 2017, p.1). Students can be flexible with the use of their time and will have a free hand in their learning options and interventions for the delineation of course material (Brooke, 2017). Therefore, applying BL principles to the EFL program, can be beneficial both for instructors and learners. This could be in line with the new trends of digitization of schools and academic settings.

Types of BL

Part of BL takes place online, away from the school setting, while another part happens FTF in a school (Staker & Horn, 2012). In a BL class, creating a technology-rich learning environment is not the final task; it is crucial to create harmony between the content of online and FTF classes (Brooke, 2017; Murray, 2019). With the incorporation of online learning, students are assumed to have more control over the time, place, pace, and path of the content than they would have in a traditional classroom setting (Brooke, 2017; Staker & Horn, 2012). The flexibility in the time of the class means that classes are based on the learners' daily schedules (INACOL Staff, 2016).

One of the most significant modes of technology in BL instruction has been the application of web-based technologies in language teaching (Bambang et al., 2016; Gorjian, 2011). Forums and chat rooms are efficient electronic tools for enhancing productive skills on the web. They enable students to interact through synchronous/asynchronous communication. Online forums have the potential to facilitate discussions about topics of common interest among the students. The focal points of such discussions are based on specific writing topics (Beal, 2010). Through chat rooms, students can exchange messages in cyberspace. For example, students can participate in readings, discuss and share strategies for completing a writing task or help each other with other course components (Minalla, 2018).

Technology-based Language Learning in Iran

Several studies on the application of computer technology have been conducted in Iranian settings (Bagheri et al., 2013; Ghahari, & Ameri-Golestan, 2014; Khazaei & Jalilifar, 2015; Mashhadi et al., 2016; Shahrokni & Talaeizadeh, 2013; Zarei & Abdi, 2016). The new trend of teaching EFL in Iranian high schools has placed a great demand on curriculum developers to design new teaching materials customized to Iranian needs and culture. In 2010, the educational curricula were reformed for all the school subjects including English (Foroozandeh & Forouzani, 2015) which was set to the top of the program in the Organization of Educational Research and Planning (OERP). In this program reform, policy makers officially announced Communicative Language Teaching (CLT) as the main principle governing the materials (Foroozandeh & Forouzani, 2015). However, this trend has not been accompanied by electronic or online supplementary materials to fill the gap for the new needs of students based on modern technologies, such as cellphones and personal computers.

The Aims of the Current Study

This study aims to prepare and deliver material based on BL learning principles via a website to improve Iranian high school students' speaking and writing skills. Concerning the new high school EFL methodology, instructing and evaluating speaking and writing skills based on BL program can be a great challenge for EFL teachers in high schools, since these skills have been almost neglected in Iranian prescribed EFL textbooks (Jahangard, 2007).

One way to indicate the progress of the students' language proficiency based on BL program is to test the speaking and writing abilities and to probe changes in the students' language production based on specific linguistic features (Hiro-tani, 2013). Over the last decade, linguistic features have been strongly emphasized. The domains of linguistic features include vocabulary, grammar, fluency, content, and rhetorical organization (e.g., Bayazidi et al., 2019; Frear & Bitche-ner, 2015; Yoon & Polio, 2017).

The most popular linguistic features under scrutiny by leading international testing systems are lexical density, variety, and syntactic complexity. These features have been reliably cited as important attributes of L2 proficiency (Crossley et al., 2011; Hirovani, 2013; Johansson, 2008; Lu, 2012; Mazgutova & Kormos, 2015). Lexical density is a measure of how many lexical items such as nouns, verbs, adjectives, and adverbs are used in a text, while lexical variety is a measure of how many different words are used in a text (Johansson, 2008). As such, syntactic complexity can be explained in terms of various measures such as the length of a production unit, the amount of subordination or coordination, the range of syntactic structures, and the degree of syntactic sophistication (Lu, 2011).

As the above review reveals, most of the literature has focused on BL practices or the analysis of linguistic features discreetly; using samples collected from a blended environment has not been the focus of previous works. Considering this gap and the under-researched context of high school as well as the new policies in the Iranian high school EFL instruction. The present research studied the long-term effects of BL on the oral and written performances of Iranian pre-intermediate high school students in terms of lexical variety and density and syntactic complexity. Hence, the following research questions are addressed:

1. Is there any development in the spoken and written performances of the two groups of BL and FTF Iranian high school students in terms of linguistic complexity (lexical variety, lexical density, and syntactic complexity) due to the effect of intervention program?
2. Are the differences between the BL and FTF groups' performances significant in terms of speaking and writing progress at the end of the project?

Method

Design

To address the research questions, we applied a quasi-experimental approach. The data collection procedure was conducted over a nine-month period covering one academic year. In the first phase, the oral and written production of the students both for BL and FTF groups were elicited via an interview and a writing exercise. In the second phase, another interview and composition were performed, containing similar questions and content as in the first phase. The results were then analyzed and compared with those of the first interview and composition. Finally, the initial and final speaking and writing production of the students were probed to scrutinize the lexical variety, lexical density, and syntactic complexity of each group of students.

Participants

The first sample participants of the study were 90 male high school students between 15 and 16 years old. From this sample, 42 students were selected as

the BL group by implementing the Top Notch Placement Test (Saslow & Ascher, 2006). Based on the classification of the Top Notch levels, 42 participants scored between 32 and 52 out of 140 and were considered to be at the pre-intermediate level.

The second sample population also consisted of 90 male high school students from another high school in the same district. Out of this sample 42 learners were selected as the control group; the same selection procedure, namely, implementing the Top Notch Placement Test (Saslow & Ascher, 2006) was adopted for this group too. Finally, a consent form was prepared and sent to the participants' parents (the students were under the legal age required to sign the document) to corroborate or reject the participation of their sons in the study and, in case of acceptance, to supply the needed tools, such as a tablet and laptop. The following statistical calculations were done to ascertain the homogeneity of the BL and FTF groups.

Table 1.
One-Sample Kolmogorov-Smirnov Test for BL Group

BL group	N	42
Normal Parameters	Mean	42.0952
	Std. Deviation	6.14781
	Absolute	.158
Most extreme differences	Positive	.121
	Negative	-.158
	Kolmogorov-Smirnov Z	1.023
	Asymp. Sig. (2-tailed)	.246

As shown in table one above, the results of One-Sample Kolmogorov-Smirnov Test on BL group confirm the normal distribution of the study sample ($p = .246$, $p > .05$).

Table 2.
One-Sample Kolmogorov-Smirnov Test for FTF Group

FTF group	N	42
Normal Parameters	Mean	41.4762
	Std. Deviation	6.15744
	Absolute	.166
Most extreme differences	Positive	.166
	Negative	-.102
	Kolmogorov-Smirnov Z	1.077
	Asymp. Sig. (2-tailed)	.197

The results of the Smirnov Test in table 2 illustrate a normal distribution of the study sample within FTF group ($P=.197$, $P > .05$).

Table 3.
Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means			
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference
B	Equal variances assumed	.043	.835	.461	82	.646	.6190

Based on the t-test and Levene's test results, the two groups were at nearly the same level of language proficiency; the difference between the groups was not significant (BL mean = 42.0952, FTF mean = 41.4762).

Materials

To collect the required data during the academic year, Vision 1 (Alavi Moghadam et al., 2016), which is the textbook used in Iranian high schools, was taught. This book is published by SAMT Publications and contains activities and tasks concerning the four main language skills, plus lessons on vocabulary, grammar, and pronunciation. This textbook is a localized source based on national values and culture.

Data Collection Instrumentation

The following instruments were utilized to collect data.

- 1) The Top Notch Placement Test (Saslow & Ascher, 2006), which is based on the Common European Framework of Reference (CEFR) standards. Top Notch is the name of a book series used to teach conversation to adult learners. This test covers three sections and includes 10 listening tests, 10 reading tests, and 120 general English tests.
- 2) The first speaking interview in the form of open-ended questions based on the textbook, which covered topics such as family, sightseeing, food, and travel and lasted from three to eight minutes for each candidate, as well as the first composition of about 100 to 150 words in which students either described their dream house or wrote about their city. See appendix for the interview questions.
- 3) The second interview at the end of the academic year, which covered topics related to Vision 1 with the same set of questions as in the first interview, as well as a composition about students' city or ambitions for the future. All interviews were recorded and then later transcribed.

In this study, two coders separately analyzed the speaking and writing corpus. The intercoder reliability of the analysis was calculated using Cohen's kappa formula. The kappa value was 0.91, which indicates substantial agreement between the two raters.

Procedure

Preparation Phase. The first stage was designing an educational interactive website parallel to the first-grade high school textbook, Vision 1 (Alavi Moghadam et al., 2016). The website was designed by a team of experts in a related field. The students were required to use their PCs, laptops, tablets, or cell phones to connect to the website and participate in the class at home or anywhere else. One of the researchers (the website administrator) was responsible for supplying and uploading the materials to the website. All the teaching activities for the BL and FTF groups were conducted by one teacher in order to control confounding variables that could result from differences between teachers.

The website is available for viewing at www.vision-blend.com. The website contained the following environments: chat room, forum, wiki, text message, exercise pages, audio and video panel, and online assessment. The online course components included a synchronous chat room, an asynchronous forum, uploaded assignments, and messages. The teacher provided feedback for all the students' submissions. The second set of activities was familiarizing the students with the website and its functions.

Instruction Procedure. This study employed a quasi-experimental approach. Initially, the Top Notch Placement test was administered to choose two homogeneous groups. The experimental group received treatment based on BL instruction, and the control group was taught based on FTF instruction only. The teaching material for both groups was the same, and the students received three hours of FTF instruction as regular activities based on their curriculum. However, for the BL group, some 30 to 40 percent of the material was delivered online via the website. In order to compensate for the extra online activities that the BL group completed, extra FTF classes were held two times a week beyond the three hours of regular instruction for the FTF group.

Due to the age group of the participants, we decided to use a limited set of platforms on the website to avoid ambiguity and to focus on production activities. Hence, the chat room and forum were selected as the two main platforms, and other facilities, such as the wiki, were not applied for the procedure of the study.

At the beginning of the academic year, an interview and composition covering the topics in Vision 1 (2016) were administered to all the participants in the BL and FTF groups. The interview contained familiar topics, such as family, travel, food, and sightseeing, which lasted from three to seven minutes. All the interviews were recorded and were later transcribed. Moreover, possible topics

for the composition (i.e., dream house, ambitions, or the cities the students live in) were provided by the researchers. During the academic year, the BL group attended three hours of FTF instruction and two online classes of 60 minutes per week. This group was divided into smaller groups of five to eight students to facilitate their participation in the online chat room and forum.

During the synchronous learning activities, the teacher provided corrective feedback and employed different correction strategies to fix students' inaccuracies. The chat activity was then used as a brainstorming tool for students' writing. The students were required to write a composition of about 100 words the following week using the ideas mentioned in the chat. They were to post their writing to the group no more than three days later.

Another activity was completed using the forum. This component was organized around weekly discussion topics posted according to the grammatical structure presented in the classroom. Table 4 summarizes the main activities performed in the BL group classes.

Table 4.
The Main Activities Conducted in the BL Class

Platform	BL (online activities)	BL group (FTF activities)
Chat room	guessing game(describing student's appearance)	Pre conversation tasks: introducing new vocabularies, matching exercises, grouping vocabulary
Chat room	Discussion: discussing a supplied topic	Matching vocabulary items with the pictures
Chat room	Interview: open-ended questions about the reading passage of the book	Listening to the CD related to the conversation section and answering the supplied questions
Chat room	Brainstorming: using chat activity as hints for writing	Pre reading activities: introducing new vocabularies related to the reading section
forum	Discussion: the topics were based on the grammatical structures of the lesson	Asking questions to activate the background knowledge
forum	Chatting: synchronous chat sessions to perform free discussion tasks	While reading activities: silent reading, paraphrasing, explaining, supplying synonyms and antonyms
forum		Post reading questions and answers

The FTF group received only FTF instruction by the same teacher (one of the researchers). One three-hour class was held each week, covering the same material as the BL group received in their FTF session. The FTF group received two extra classes of one hour each to compensate for the online activities performed by the BL group.

In later sessions, grammar points were presented, first inductively through a written text and then deductively through tables. The topics for discussion and writing were the same, and the same interview and writing activities were held for this group similar to the BL group but in an FTF mode. All the language

tasks were facilitated by the teacher in the FTF mode, including role playing, open-ended questions, and controlled question-and-answer exercises.

However, due to the nature of FTF classes, we occasionally gave some explicit grammar-based feedback. Throughout the BL and FTF activities, we tried to balance the amount of time allocated to each group. However, due to the nature of online activities, the time allocated to the groups was not identical. Finally, the students' writing and speaking samples were collected and analyzed. Table 5 summarizes the main activities done in the FTF group class.

Table 5.
The Main Activities Done in the FTF Group Class

activity	FTF class activities	FTF extra activities
	Pre conversation tasks: introducing new vocabularies, matching exercises, grouping vocabulary	contextualization of the vocabularies in new sentences
	Matching vocabulary items with the pictures	Reviewing the conversation section
	Listening to the CD related to the conversation section and answering the supplied questions	Asking questions about the conversation
	Pre reading activities: introducing new vocabularies related to the reading section	Asking mechanical meaningful questions based on the patterns in conversation
	Asking questions to activate the background knowledge	Discussion about the reading passage
	While reading activities: silent reading, paraphrasing, explaining, supplying synonyms and antonyms	Brainstorming about the reading to prepare for the writing activity
	Post reading questions and answers	

Measures of this Study

In this study, both lexical and syntactic complexity were examined. Lexical complexity was probed in terms of lexical variety and density. Lexical variety deals with how many types of words (i.e., how many different lexical items) exist in all tokens of words (i.e., all words). Instead of using a type-token ratio, which is a commonly employed measure for lexical variety (Warschauer, 1996), the lexical variety was calculated by dividing the number of types by the square root of the doubled number of tokens. Table 6 presents the linguistic indices used to evaluate the participants' oral and written performance.

Table 6.
Measures Adopted to Calculate Linguistic Features

Category	Subcategory	Measure
	Lexical Variety	$\text{type} / \sqrt{2 \cdot \text{token}}$
Lexical complexity	lexical density	$\text{type of content words} / \sqrt{2 \cdot \text{token of content words}}$
	Syntactic complexity	The number of clauses per AS-unit

This procedure is based on the work of Tajima (2002), who claims that lexical variety can be measured precisely with this formula. Lexical density is concerned with the percentages of the types of words (i.e., nouns, verbs, adjectives, and adverbs) used. Accordingly, function words (i.e., particles and auxiliary verbs) were first discounted from all types of words, and lexical density was then computed by dividing the number of content word types by the square root of the doubled tokens of the content words. Lastly, syntactic complexity was computed as the number of clauses per analysis of speech unit (AS-unit) (Tajima, 2002). The AS-unit is defined as “a single speaker’s utterance consisting of an independent clause, or sub-clausal unit, together with any subordinate clause(s) associated with either” (Foster et al., 2000, p. 365). Utterances without predicates were permitted and counted as separate units. The following is an extract from the samples, which is analyzed as an example.

A few years ago, we had a big garden (AS Unit) and we would always go there and sat under the trees together with our friends (AS Unit). Then we thought that the garden is big enough to build a villa in it (AS Unit). After some years, we made it very beautiful (AS Unit) and had a lot of facilities such as a swimming pool there (AS Unit).

Tokens = 69, types = 41, AS Units = 5

Results and Discussion

In order to trace the development of the speaking and writing skills of high school students in terms of the linguistic features, the written and spoken products of the students obtained from written compositions and interview sessions were analyzed. Consequently, the linguistic features were assessed in terms of lexical variety, lexical density, and syntactic complexity (Hirotani, 2013). In order to calculate these features, we adopted Hirotani’s (2013) model. In applied linguistics studies conducted by Hirotani (2013), Housen and Kuiken (2009), and Tavakoli and Foster (2011), linguistic complexity was considered to be a significant variable when measuring L2 performance and proficiency.

The First Research Question

The first research question was concerned with the development in the spoken and written performances of the two groups of BL and FTF Iranian high school students in terms of linguistic complexity (lexical variety, lexical density, and syntactic complexity) due to the effect of intervention program. In order to answer this question, the written and spoken products of the students obtained from the written compositions and interview sessions in the first stage were analyzed and compared with those of the final samples for both the FTF and BL groups through a paired sample test using SPSS 22. Table 7 demonstrates the obtained results in FTF group.

Table 7.
Paired Samples Test FTF Group

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Devia- tion	Std. Error Mean	95% Confidence Interval of the Dif- ference				
					Lower	Upper			
Pair 1	LDW.pre LDW.post	.1862	.06443	.00994	.1661	.2063	18.72	41	.000
Pair 2	LVW.pre LVW.post	42.40	18.6221	2.87346	36.6017	48.207	14.75	41	.000
Pair 3	SCW.pre SCW.post	.7804	1.95581	.30179	.1710	1.3899	2.586	41	.013
Pair 4	LDS.pre LDS.post	.2264	.07914	.01221	.2018	.2511	18.54	41	.000
Pair 5	LVS.pre LVS.post	84.80	36.2203	5.58892	73.5225	96.096	15.17	41	.000
Pair 6	SCS.pre SCS.post	1.208	1.06653	.16457	.8758	1.5405	7.341	41	.000

The results of table 7 show that, the P-value (0.001) for all the indices of linguistic features under study in this research is less than 0.05, which shows a significant difference between each pair of the lexical density, lexical variety and syntactic complexity of speaking and writing at the beginning and end of the project for FTF group. Table 8 demonstrates the results of the test in BL group.

Table 8.
Paired Samples Test BL

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Devia- tion	Std. Error Mean	95% Confidence Interval of the Dif- ference				
					Lower	Upper			
Pair 1	LDW.pre LDW.post	.169	.06703	.01034	.1486	.1904	16.3	41	.000
Pair 2	LVW.pre LVW.post	18.0	13.783	2.1267	13.728	22.31	8.47	41	.000
Pair 3	SCW.pre SCW.post	1.07	1.2952	.19986	.6678	1.475	5.36	41	.000
Pair 4	LDS.pre LDS.post	.201	.07247	.01118	.1788	.2240	18.0	41	.000
Pair 5	LVS.pre LVS.post	13.7	21.039	3.2464	7.2293	20.34	4.24	41	.000
Pair 6	SCS.pre SCS.post	1.40	1.3773	.19457	.7758	1.5405	8.341	41	.000

Based on the results obtained in table 8, the p-value in all the indices is less than 0.05 which shows significant changes between the linguistic features in pre and post elicitation. Hence, we can conclude that based on the results of the Pair Sample Test in BL and FTF group, the effect of Intervention for both groups was significant and all the linguistic features developed in FTF and BL groups after nine months of academic year.

The Second Research Question

The second research question was concerned with the end products of the FTF and BL groups and compared the effect of BL instruction and FTF intervention on Lexical density, lexical variety and syntactic complexity of the groups under study. In this study, the following statistical calculations were conducted. Table 9 illustrates the descriptive analysis of the different linguistic features for the second corpus in the FTF and BL groups.

Table 9.
Indices of Linguistic Features in BL and FTF Groups in Post Tests

Group		N	Post- test	
			Mean	Std. Deviation
LDW	FTF	42	.4569	.04703
	BL	42	.4788	.04759
LVW	FTF	42	61.6905	14.09288
	BL	42	85.1190	19.10332
SCW	FTF	42	9.4327	5.30386
	BL	42	8.4751	1.52832
LDS	FTF	42	.4576	.02377
	BL	42	.4755	.03156
LVS	FTF	42	99.6667	30.39389
	BL	42	170.8810	34.09685
SCS	FTF	42	6.8993	.66664
	BL	42	6.5598	.97709

Based on table 9, the mean values of LDW, LVW, LDS, and LVS are higher for the BL group than FTF. However, the opposite trend is observed for SCW and SCS. Thus, it can be inferred that, in terms of both writing and speaking, the BL group outperformed the FTF group. Moreover, the researchers discovered that the syntactic structures exhibited in written language performance is more complex than that exhibited in spoken language (Brown & Yule, 1983; Pietilä, 1999). Hence, the results of the mean values are in line with those of previous studies (SCW mean \geq SCS) (Table 9). From another aspect, in this study, the amount of language production was higher in the BL group than in the FTF group. The FTF corpus contained 12,654 words, while the BL corpus encompassed 14,573 words. This is in line with Abrams's (2003) study concerning language production in a computer-mediated communication.

At this point, a one-way ANOVA was conducted in SPSS 22 to find whether there were statistically significant mean differences among the linguistic indices of the FTF and BL groups.

Table 10.

The Results of ANOVA Test on the Second Speaking and Writing Corpus of BL and FTF Groups

Source	variables	Sum of Square	Degree of freedom	Mean square	F	Sig.
Groups	LDW	.010	1	.010	4.502	.037
	LVW	11526.857	1	11526.857	40.908	.000
	SCW	19.259	1	19.259	1.264	.264
	LDS	.007	1	.007	8.579	.004
	LVS	106500.964	1	106500.964	102.091	.000
	SCS	2.420	1	2.420	3.459	.066

As the data in Table 10 demonstrates, the P-value (0.001) for LDW, LDS, LVS and LVW is less than 0.05, which shows a meaningful difference between the lexical density and lexical variety of speaking and writing samples in the BL and FTF corpus. As the mean score of the BL group is larger than that of the FTF group, it is logical to conclude that improvements in the lexical density and lexical variety of the BL group were more salient than those of the FTF group. However, in table 10, we observe that the p-value of SCS and SCW was not significant for the BL group and the FTF group had a better performance. Hence, considering the above calculations, we can conclude that four indices of LDS, LDW, LVS, and LVW were higher in BL group and SCS and SCW were larger for the FTF group.

Discussion

Kim (2014) believes that writers with more proficiency produce a greater density of words. The LD index in this study contradicts previous studies that have indicated that there is no statistically significant relationship between lexical density and L2 proficiency level (e.g., Crossley & McNamara, 2009; Lu, 2012; Park, 2013). The density of a lexical network (i.e., the number of connections a network contains) is known to increase as more connections are built during L2 development (Lu, 2012). In a BL environment, because the students are exposed to online multimedia materials as a part of their curriculum and benefit from the presence of a teacher during FTF classes, they receive more meaningful input. Hence, they retain lexical items efficiently. This is in line with the theory of the integrated model of SLA and multimedia proposed by Plass and Jones (2005). Based on this model, meaningful input is enhanced through the dual presentation of words (oral and/or written) and pictures (static and/or moving).

The lexical variety (LVW and LVS) exhibited by the second corpus revealed significantly greater improvements in the writing and speaking abilities of the

BL group in comparison to the FTF group (Table 10). Lexical variety has been cited as a clear predictor of learners' general language proficiency (e.g., Yu, 2010) and a crucial indicator of the quality of their speaking task performance (e.g., Jarvis, 2002; Malvern & Richard, 2002) and writing (e.g., Laufer & Nation, 1995). Such positive relationships are also stated explicitly in the rating scales of major international language tests such as IELTS and TOEFL IBT. As a result, the quality of production in the BL group is significantly better than that of the FTF group after the nine-month intervention in this study.

Finally, the P-values for the SC of the speaking and writing samples are greater than 0.05 (Table 10), meaning that these results are not significant. Hence, the FTF corpus showed superiority over the BL group in these indices. Some studies have used corpus data to determine the frequencies of syntactic constructions and concluded that a lower frequency corresponds to greater complexity (e.g., Wiersma et al., 2011). Moreover, speakers who produce longer utterances also produce less frequent and more complex syntactic structures (Kim, 2014). In the present study, however, the number of clauses per AS-unit dropped significantly when the learners' proficiency level increased (Lu, 2014). Consequently, Lu (2014) noted that as students become more proficient, phrasal rather than clausal complexity becomes more prominent feature in the students' writings. Thus, based on the above assumptions, it is possible that even though the SCW and SCS indices of BL learning were not higher than those of the FTF group, the BL groups' production can be considered more complex and more developed.

Previous research on BL is generally in harmony with the results of this study (Acelajado, 2011; Bambang et al., 2016; Means et al., 2009). Moreover, the active participation of students in completing the allocated tasks might be due to the novelty of BL (Hamilton, 2018) in EFL classes, which, in turn, enhance the motivation of the students to meet the goals of the curriculum. One of the most serious problems in formal high school English classes is the lack of motivation due to inappropriate teaching materials and content (Legault et al., 2006), the fact that there is no authentic English environment outside the classroom, overcrowded classes, and limited teaching time and resources (Locastro, 2001; Maringe & Sing, 2014).

Hence, by implementing BL principles, choosing the right method and the right materials, and attending to the needs and interests of students, this obstacle can be mitigated or even removed. This is in line with other research works that have pointed out the positive motivation and participation in BL courses (De George-Walker & Keeffe, 2010; Ugur et al., 2011).

Furthermore, some scientists such as Beauvois (1992), Chun (1994), and Kelm (1992) have suggested that the linguistic development of BL groups might be due to the transfer of online linguistic performance to FTF performance. In line with this, we observed that students were more prepared for FTF sessions if they had performed online discussion tasks or online writing tasks in the previous days. For example, during writing sessions, students had more ideas

of what to write about after the brainstorming sessions that they had completed asynchronously on the forum platform.

Secondly, engaging in more than one sense in the teaching process and employing a variety of teaching techniques, such as multimedia, animation, and tests, may have promoted learning (Mayer, 1997, 2005). However, efforts to increase the efficiency of class time should not be ignored. Improvements in the language production of students might be partially attributed to the use of class time in a strategic form. Garrison and Kanuka (2004) argue that in BL classes, the traditional lecture-based way of teaching is abandoned so that some class time can be allocated to enriching and meaningful activities. These activities enable the students to accelerate their learning at an individual pace, as supported by the theory of multimedia learning (Mayer, 2009, 2014), and they can foster students' different learning styles. Also, these learning activities occur in a non-threatening learning environment, which encourages communication among students and teachers, thus increasing students' motivation and interest in learning.

Conclusion and Implications

In this study, the lexical variety and density in the oral and written performances of high school students in the BL group were improved due to the positive impact of a BL environment. The BL format was found to be superior to traditional FTF classes when the focus of attention was on speaking and writing skills. This deduction is based on the empirical data we obtained throughout an academic year. BL improves the learning environment by enabling students to engage in more than one type of learning and providing multimedia resources and promoting self-learning strategies that can lead learners to practice learning English independently. Moreover, cooperation among online groups motivated shy students to present themselves more effectively both in synchronous and asynchronous activities.

The transfer of online linguistic performance to FTF performance further justified the better performance of the BL group. This could be a reason for the development of the communication skills of students, which, in turn, led to the production of more advanced language as indicated by the writing and speaking samples.

The findings of the current study lead to important implications for L2 researchers and educators. First, our results revealed significant differences in terms of two linguistic features (LD and LV) between the BL and FTF groups. By examining the effect of linguistic features on L2 writing and speaking, we obtained more comprehensive results than would have been possible through other methods of calculating writing and speaking proficiency.

Second, students need to practice varying their sentence structures in writing compositions and speaking performance. With this understanding, findings from this study point to the importance of considering the predictors of L2

writing and speaking proficiency when we teach language learners and assess their language products. Many studies have measured the extent to which accuracy, fluency, and grammatical complexity can indicate a learner's overall proficiency in L2 (e.g., Wolfe-Quintero et al., 1998; Zareva et al., 2005).

The results of this study are of practical use for classroom instruction to adjust the curriculum at the high school level. Students must be aware that by using and learning certain linguistic features, more value is attached to their language production. This study is conducted in a high-school setting among students with a specific level of proficiency and cannot be extended to other proficiency levels and age groups. With younger students, an optimal result is not to be expected due to their lack of computer knowledge. Conversely, with more proficient students, even better results than those reported here might be obtained.

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Appendix

Interview Sheet

1. Please tell me your full name and talk about yourself a bit.
2. What's your plan for the next summer? Where will you go? Who will be with you? What will you do there?
3. Suppose that a tourist is going to visit your city, describe your city for him/her?
4. What do you do in your free time?
5. Who is your best friend? Can you describe him/her for me?
6. Talk about the last time you went on a picnic? Who was with you? Where did you go? What did you do?
7. What did you do last weekend?