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The Effect of Technology-Enhanced Language Learning (TELL) and Formative Assessment Strategies on Iranian EFL Students' Writing Self-Efficacy

Shahrbanoo Parichehreh, Zari Sadat Seyyedrezaei*, Ghasem Barani, Omid Mazandarani

Department of English Language Teaching, AK.C., Islamic Azad University, Aliabad Katoul, Iran.

***Corresponding author:** z.seyyedrezaei@iau.ac.ir

Original Research

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Abstract:

The investigation centered around the effect of BigBlueButton and formative assessment strategies (Mind Dump and Word Journal) on Iranian EFL students' writing self-efficacy. Having utilized a quasi-experimental pretest-posttest design, this study was conducted among 90 participants selected via convenience sampling. Quick Placement test was distributed to 120 students from English Translation and English Literature at Sari and Qaemshahr branches of Azad University. 90 Iranian sophomore students were chosen and divided randomly into Control, Face-to-Face, and BigBlueButton groups. Students in each experimental group (Face-to-Face and BigBlueButton) were categorized into two subgroups (Mind Dump and Word Journal) and provided with instructions in writing that incorporated Mind Dump and Word Journal strategies. At the same time, students in the Control group were taught writing with traditional methods and they did not use these strategies. Additionally, a Second Language Writing Self-efficacy questionnaire was employed to appraise students' writing self-efficacy. Participants were distributed the questionnaire once before the instruction and once after the instruction. Bonferroni Post-hoc Test analysis indicated writing self-efficacy of students using Mind Dump and Word Journal in BigBlueButton and Face-to-Face groups improved compared to those in the Control group. It was also revealed that writing self-efficacy of students using Mind Dump strategy in both experimental groups improved significantly compared to those using Word Journal in Face-to-Face and BigBlueButton groups. Furthermore, writing self-efficacy of students in BigBlueButton showed a notable improvement when compared to those participating in Face-to-Face. Finally, this study's findings might have implications for EFL teachers. Moreover, these findings suggest that educational institutions should consider incorporating such digital resources and creative teaching techniques to improve students' writing self-efficacy.

Keywords: Formative assessment atrategies; Mind dump; Technology-Enhanced Language Learning; Word journal; Writing self-efficacy

Introduction

In teaching a foreign language, teachers usually use conventional approach to explain resources with conventional way in traditional classes (Brown, 2001). Still, Technology-enhanced Language Learning (TELL) or digital technologies have offered a substitute for conventional classroom settings (Anderson & Dron, 2011). Technology-enhanced Language Learning in remote education encompasses applications that enable teachers to deliver instructional materials to learners via learning platforms (Han, 2018). Thus educational institutions have transitioned from conventional classroom instruction to online teaching due to the advent of learning applications (Cizmesija & Bubas, 2020).

One of the most popular applications among online learning applications is BigBlueButton (Cizmesija & Bubas, 2020) which is a web-based, open-source conferencing platform that facilitates synchronous communication by supplying virtual environments for the real-time exchange of audio, video, presentations, chat, and educational interactions (Turulja et al., 2021). Galindo-Gonzalez (2020) states

that BigBlueButton enables students and teachers to communicate information via various means which makes it an effective tool for distance learning environments. He points out that this system facilitates the recording of sessions and, thus provides an opportunity for students to access the instructional material multiple times. Also BigBlueButton can facilitate teachers in providing learning tasks and assessment wherever and whenever, and by integrating BigBlueButton into the learning environment, there is a promising opportunity to enhance students' academic performance (Ukoh, 2021). Furthermore, students instructed through BigBlueButton may gain knowledge and skills through implementing different strategies such as Mind Dump and Word Journal.

Formative assessment applications can significantly accelerate the pace of learning among students if appropriately implemented (Wiliam, 2007). It aids not only instructors but also students – it gives educators insight on how to form instruction to satisfy the requirements of their students and it gives students feedback, which helps them in their attempts to achieve learning objectives (Rasmussen, 2017). Formative assessment includes a number of strategies to check students' knowledge and allow instructors to detect any hindrances to a student's progress (Greenstein, 2010). Some of these strategies organized as writing formative assessment strategies are Mind Dump and Word Journal. Mind Dump strategy enables students to retrieve information and utilize memory triggers as they come to mind, and Word Journal strategy encourages students to engage deeply with a reading passage by selecting an appropriate word that encapsulates the central theme and articulates their reasoning in one or two paragraphs, explaining the relevance of their chosen word concerning the text (Rasmussen, 2017). Most importantly, formative assessment strategies may affect students' self-efficacy in learning environments.

In learning settings, self-efficacy is considered a driving force that makes people pursue a goal (Ersanli, 2015) and is viewed as the confidence that students possess considering their potentiality or ability to succeed in acquiring new knowledge or accomplishing specific task requirements (Bandura, 1977) as cited in (Truong, 2022). Bandura (1977) points out that the discrepancy in performance can be attributed to the varying impressions that students hold regarding their capability. Furthermore, in writing class, students' beliefs or students' writing self-efficacy is considered crucial (Rahimi & Fathi, 2021). Fostering writing self-efficacy may influence students' persistence and motivation in accomplishing their writing tasks (Truong, 2022). Zhang (2018) suggests that, for language learners, cultivating self-efficacy in their own capability ensures that they are able to complete tasks effectively. Chea and Shumow (2017) state the activities an individual selects to do during writing are impacted by writing self-efficacy.

But the problem is that some students struggle with self-confidence when creating quality written wok. To help students increase their writing self-efficacy, writing formative assessment strategies were implemented in the classroom. In addition, an online learning/teaching platform (BigBlueButton) was used as a means of instruction. It should be noted that the type of writing formative assessment strategies (Mind Dump and word Journal) and online learning/teaching platform (BigBlueButton) implemented in this study are different from those used in prior studies. Furthermore, to the best of the researcher knowledge, Mind Dump, Word Journal, and BigBlueButton have been applied together for the first time to examine their effect on Iranian EFL students' writing self-efficacy. There has been several research on implementing online environments or formative assessment strategies to improve students' self-efficacy or writing self-efficacy (Alberth, 2019; Baleghizadeh & Masoun, 2014; Fathi et al., 2019, 2021; Lee & Evans, 2019; Li, 2023; Rahimi & Fathi, 2021; Ruegg, 2018; Salajeghe & Hasani, 2022), but to the best of the researchers' knowledge, in the Iranian EFL context, no research study seems to have been done addressing the effect of BigBlueButton and formative assessment strategies (Mind Dump and Word Journal) on students' writing self-efficacy. It is worth noting that in spite of the growing body of research on digital learning settings and formative assessment strategies, there remains a notable gap in the literature considering their combined effect on writing self-efficacy among Iranian EFL students. While existing research studies have examined the benefits of various learning/teaching platforms in facilitating online learning, and others have examined various formative assessment practices, few have investigated how these elements work together to enhance students' confidence in their writing abilities. Moreover, much of the research carried out to date lacks a contextual focus on the Iranian educational landscape, which may present unique challenges and opportunities that differ from those in other cultural environments. Without a thorough understanding of how these integrated approaches can enhance writing self-efficacy, educators may miss critical opportunities to implement effective strategies tailored to their students' needs. Therefore, to fill this gap, this research was designed to examine the impact of BigBlueButton and formative assessment strategies (Mind Dump and Word Journal) on Iranian EFL students' writing self-efficacy. To meet research objectives, the questions are as follows:

1. *Does writing self-efficacy of Iranian EFL students who receive instruction through BigBlueButton and Face-to-Face differ significantly from those receiving traditional instruction in the Control group?*

2. *Does writing self-efficacy of Iranian EFL students who use Mind Dump compared to those who use Word Journal in the Face-to-Face and BigBlueButton groups in total differ significantly from those who do not use Mind Dump and Word Journal in the Control group?*

3. *Does writing self-efficacy of Iranian EFL students who use Mind Dump in BigBlueButton differ significantly from those in Face-to-Face?*

4. *Does writing self-efficacy of Iranian EFL students who use Word Journal in BigBlueButton differ significantly from those in Face-to-Face?*

Review of literature

Technology-Enhanced Language Learning (TELL)

The direction of foreign language instruction is undergoing a change due to the expansion of technological tools (Ghanizadeh et al., 2018). The rapid technological development has provided teachers with opportunities to utilize technology for instruction (Shadiev & Yang, 2020). According to Yang and Chen (2007), the incorporation of multimedia technology in the realm of foreign language education has been increased rapidly. In addition, emerging technologies are very helpful to be utilized for pedagogical methods for teaching (Shadiev & Yang, 2020). Lin (2018) states TELL can improve learners' performance and equip pupils with more superior means for effective language learning. Yang and Chen (2007) state that some research studies demonstrate that technology-enhanced language learning can improve the thinking connection, increase student confidence, and develop students' writing performance. They point out that in light of these positive impacts, an increasing number of ESL/EFL instructors have supported technology-enhanced language learning. Additionally, Ghanizadeh et al. (2015) state the integration of technology within EFL/ESL environments creates a pleasurable atmosphere that facilitates English learning for students.

Formative assessment and constructivist theory

Formative assessment has become a "hot topic" of discussion among educational community and is defined as "activities undertaken by teachers - and by their students in assessing themselves – that provide information to be used as feedback to modify teaching and learning activities" (Black and Wiliam (1998b), p.140). In fact, through formative assessment, educators gather information to pinpoint the areas of learning deficiencies experienced by students which is subsequently applied to formulate approaches to effectively rectify these deficiencies. Formative assessment plays a crucial role in conveying essential information to students and their supporters about the learning objectives, the students' current position regarding these objectives, and the actions that can be undertaken to foster their succeeding performance (Black & Wiliam, 2010). Moreover, skilled educators employ formative assessment in the course of instruction to recognize particular areas of misunderstandings among students, providing students with feedback that supports error correction and the application of corrective instructional strategies (Cauley & McMillan, 2010). They assert that it is perceived as a process which is deliberately designed that enables educators to intentionally and continuously accumulate evidence of student performance which is then utilized in a productive manner to raise confidence and participation among students.

Formative assessment has been the subject of a number of probing. The initial studies on formative assessment emphasized the instructor's role as the one who engages with the data that has been compiled. The potential impact of formative assessment in shaping teaching strategies and enhancing academic outcomes was disclosed by Crooks (1988) through the meta-analysis. Furthermore, the subsequent phase of inquiry concerning formative assessment focused on the dual roles of the educator as an implementer of formative assessment and the student as the primary recipient of the collected information (as cited in Ruland (2011)).

The most important insights derived from the next phase of inquiry regarding formative assessment were associated with Black and Wiliam (1998a)'s advocacy for the idea of offering students continuous and consistent feedback about their learning, asserting that this feedback can assist the individual student and class with large learning gains. Cauley and McMillan (2010) point out that the effectiveness of feedback for students is significantly enhanced when it concentrates on skill enhancement and achievement, while dealing with mistakes as opportunities for learning. They point out "Feedback about their progress in learning gives students hope and positive expectations for themselves" (p.3).

Furthermore, the concept of formative assessment corresponds with the principles of constructivism which underscores the active involvement of pupils in the process of building their own meanings through experiences and communications. Throughout the time of the constructivist post method era, the conventional principles of instruction and evaluation have been changed into a more student-focused and effective learning environment (Alam & Aktar, 2019). They also state that the application of formative assessment serves as a more authentic approach that can positively synchronize the learning process with the goals outlined in the curriculum. Moreover, studies concerning language learning via the lens of constructivisim have shown that knowledge is not passively achieved rather it is actively constructed (VonGlaserfeld (1995) as cited in Birjandi and Hadidi Tamjid (2012)) by students.

Self-efficacy

The notion of 'self-efficacy' highlights individuals' self-assurance in their potentialities to plan and conduct activities needed to create achievements (Bandura, 1977). The interplay between self-efficacy and confidence is fundamental in determining how an individual apprehends their capabilities, which can subsequently influence their performance (Raoofi et al., 2012). According to Bruning et al. (2013), this concept is indicated through an individual's readiness and willingness to undertake various tasks as well as their determination to overcome obstacles that may arise during the process. Alberth (2019) states pupils with elevated self-efficacy are more prone to outperform more capable peers who exhibit a diminished sense of self-efficacy. He points out that this concept is significant within the realm of learning languages, especially with respect to language skills. Since it is presumably skill specific, it may differ across various language skills (Alberth, 2019). Martinez et al. (2011) state that an individual's self-assurance in writing capabilities is described as writing self-efficacy. In other words, writing self-efficacy is students' beliefs in their abilities to write and it is thought to be context specific (Bruning et al., 2013).

Regarding writing self-efficacy, various studies have been undertaken. Pajares (2003) examined the contribution made

by the self-efficacy element in the examination of writing within educational settings. The findings revealed that the extent of self-assurance that pupils hold regarding their writing capabilities impacted their overall writing performance in school. Baleghizadeh and Masoun (2014) investigated how self-assessment impacts the extent of self-assurance of EFL students and found that their self-efficacy improved significantly due to the implementation of self-assessment on a formative basis in the experimental group. Alberth (2019) scrutinized the role of Facebook as a social media platform in shaping students' self-efficacy within a traditional writing class. The results indicated students' self-efficacy improved and direct constructive feedback is favored to a higher degree by participants.

Fathi et al. (2021) analyzed the influence of the implementation of peer-assessment and self-assessment strategies on Iranian EFL learners' performance and self-efficacy within a writing class. It was revealed not only self-assessment activities but also peer-assessment strategies were remarkably effective. Moreover, it was indicated that activities involving peer-assessment demonstrated greater effectiveness compared to those centered on self-assessment in enhancing EFL students' writing self-efficacy and writing performance. Rahimi and Fathi (2021) discovered that collaborative writing instruction, whether conducted via wikis or through other means, led to the enhancement of writing self-efficacy of EFL students. Salajeghe and Hasani (2022) investigated the impact of online learning via BigBlueButton on Iranian EFL learners' writing achievement and self-concept. Fifty pre-intermediate students were divided into experimental (online instruction) and control (traditional instruction) groups. Writing performance and self-concept were measured using pre-and post-tests. Findings revealed that online instruction significantly enhanced both writing performance and learners' self-concept compared to conventional methods. Li (2023) demonstrated that online collaborative writing instruction positively affected the writing self-efficacy of Chinese EFL students in the experimental group compared to those in the Control group.

Overall, it seems that insufficient studies have been done regarding the influence of online platforms and formative assessment strategies together on students' writing self-efficacy. Therefore, this study investigated if writing self-efficacy of Iranian EFL students who received instruction through BigBlueButton and Face-to-Face differs significantly from those receiving traditional instruction in the Control group. Furthermore, it attempted to investigate if writing self-efficacy of Iranian EFL students who used formative assessment strategies (Mind Dump and Word Journal) in BigBlueButton differs significantly from those who used the same strategies in the Face-to-Face group.

Methods

Participants

The selection of study participants was conducted through convenience sampling approach. They were chosen from intermediate students from English translation and English literature, through Quick Placement Test (QPT) administered at the commencement of the course. They were 90 Iranian EFL sophomore students at Sari and Qaemshahr branches of Islamic Azad University, aged between 18 and 24. They were categorized into three groups (Control, Face-to-Face, and BigBlueButton) at random. The participants in each experimental group (Face-to-Face and BigBlueButton) were divided into two subgroups, one used Mind Dump and the other one used Word Journal.

To choose the participants, 120 male and female EFL sophomore students were given Quick Placement Test. Table 1 provides the results derived from the descriptive statistics.

Based on the results displayed in Table 1, regarding students' mean score 29.86 and standard deviation $\pm$ 4.62, 90 students whose scores fell within 25 and 35 were chosen. In essence, 90 EFL students, whose scores ranged from one standard deviation over to one standard deviation under the average, were included in the selection process and were allocated into three distinct groups randomly. 30 out of 90 were assigned to Control, 30 were assigned to Face-to-Face and 30 were assigned to BigBlueButton. Face-to-Face and BigBlueButton groups (experimental groups) were divided into two subgroups (Mind Dump and Word Journal).

Instruments

Quick Placement Test (QPT)

To homogenize the participants and choose EFL intermediate students, Quick Placement Test (2001) was used. It is divided into two parts, comprising 60 questions that are all multiple-choice. Part one was given to the students due to time constraints. According to Geranpayeh (2003), students whose scores fell between 24 and 40 were considered as students at an intermediate level.

Second language writing self-efficacy questionnaire

This scale was developed by Han (2018)) to measure learners' beliefs and confidence in their capabilities as L2 writers (see Appendix). It consists of seven items to examine the beliefs and confidence of L2 students regarding writing capabilities. This questionnaire incorporates a 5-point Likert scale, where participants can pick responses that range from 1 denoting strong agreement to 5 indicating strong disagreement. It underwent a pilot phase involving 20 EFL students having identical characteristics with the target participants prior to the main study procedure and their reliability was

Table 1. Results of descriptive analysis for QPT.

QPT	N	Mean	Std. Deviation	Min	Max	Kolmogorov Smirnov Test	
						Statistic	Sig.
	120	29.86	4.62	13	38	.981	.005

computed. Cronbach's Alpha, as computed by SPSS version 28, was employed to calculate the reliability of the instrument. The reliability coefficient of SLWSS is displayed in the subsequent table.

The reliability index for the SLWSS, as illustrated in Table 2, is .78. Hence, the measurement tool used in this study is acceptable for internal consistency and is reliable and the data gathered through this instrument was used for analyses.

Procedure

Using the following procedures, the research questions were addressed. First, the reliability of the questionnaire was calculated with 7 items that were responded by 20 Iranian EFL students having identical characteristics with the target students prior to the main study procedure. Next, to choose the participants of the study, convenience sampling was utilized. In addition, the Quick Placement Test was distributed to 120 Iranian EFL students from different majors, including English Translation and English Literature at Sari and Qaemshahr branches of Islamic Azad University. 9o EFL students with scores ranging from 25 and 35 were chosen and were allocated into three distinct groups (Control, Face-to-Face, and BigBlueButton) through a random selection process. Then participants in Face-to-Face and BigBlueButton were categorized into two subgroups, one used Mind Dump and the other one used Word Journal. During the initial session, a questionnaire for writing self-efficacy was distributed to the participants in all groups for later comparisons. The questionnaire was administered in a Porsline format in the BigBlueButton group.

Over the course of a 16-week semester, students in all groups were taught narrative writing two hours per week. The second edition of Practical English Writing Skills written by Mona Scheraga was applied for teaching writing skills. Students in three groups (Control, Face-to-Face, and BigBlueButton) were taught how to write a formal five-paragraph essay. Students in Face-to-Face and BigBlueButton groups were taught narrative writing and they used formative assessment strategies (Mind Dump and Word Journal) during the course, while students in the Control group were instructed with traditional teaching methods and they did not use these strategies. Meanwhile, students in Face-to-Face and BigBlueButton were presented with an explanation of two formative assessment strategies. In other words, the teacher explained to them how to use these specific strategies. Regarding Mind Dump, students composed everything they could recall from the readings in five to ten minutes after they read and answered any questions about the reading. Students who used Word Journal chose one word that summarized what they had read after reading a brief passage. Students wrote one or two paragraphs of why the term they selected was fit the text. Individuals in each subgroup were given 15 minutes to implement determined strategy at the end of each session.

In the BigBlueButton group, the features of BigBlueButton were introduced to students, and how to use them was explained. For example, the instructor provided a thorough explanation of how to write sentences and paragraphs, how to interact with group members and how to turn in their assignments via BigBlueButton. BigBlueButton was employed for supplying materials, practicing exercises, offering assistance, and conducting assessments. The instructor set up and maintained accounts in the BigBlueButton group, and enabled students to register and obtain their own username and password. This helped students access and join the BigBlueButton group smoothly. Finally, the same writing self-efficacy questionnaire was administered to all participants in all groups at the end of the course.

Design of the study and data analysis

This investigation adopted a quasi-experimental design characterized by pretest and posttest phases. Covariance Analysis (ANCOVA) was employed to analyze the obtained data. The data that was gathered underwent computation via SPSS version 28. In the section dedicated to descriptive results, descriptive statistics such as mean and standard deviation were computed. In the inferential results section, research questions were answered using the Kolmogorov Smirnov Test (K-S Test), Cronbach's Alpha, Levene's Test, Covariance Analysis, and the Bonferroni Post-Hoc Test.

Results

To answer the first research question, the K-S Test was calculated to demonstrate the normality of data distribution. Next, descriptive statistics were computed to analyze the mean scores obtained in the pre-test and post-test. Moreover, to indicate the equality of variances, Levene's Test was computed. Since the normality of data distribution and the equality of variances were proved, Covariance Analysis was run to indicate the impact of BigBlueButton, Mind dump, and Word Journal upon the dependent variable. Finally, the Bonferroni Post-Hoc Test was calculated to analyze multiple pairs of means. The subsequent tables display the results of these tests. Table 3 indicates the results of descriptive analysis of students' writing self-efficacy scores in all groups.

Table 3 displays that the mean scores of EFL students' post-test writing self-efficacy in the Control group (M = 22.5), Face-to-Face (M = 24.0), and BigBlueButton (M = 25.8) are statistically different. It was also indicated that EFL students' writing self-efficacy improved significantly after receiving instruction in experimental groups. But the average score of participants' post-test writing self-efficacy improved slightly in the Control group. Moreover, the results of the K-S Test indicated normal distribution (Sig >

Table 2. Statistical analysis of reliability for second language writing self-efficacy questionnaire.

Cronbach's Alpha	Total Items
.783	7

Table 3. Descriptive analysis pertaining to students' pre-test and post-test writing self-efficacy scores in Face-to-Face, BigBlueButton, and control groups.

Group	Test	N	Mean	Std. Deviation	Min	Max	Kolmogorov Smirnov Test	
							Statistic	Sig.
Control	Pre	30	22.2	1.18	14	28	1.201	.385
	Post	30	22.5	1.35	14	29	1.313	.206
Face-to-Face	Pre	30	22.2	1.22	13	29	1.112	406
	Post	30	24.0	1.58	15	31	1.416	.191
BigBlueButton	Pre	30	22.1	1.21	14	28	1.204	.372
	Post	30	25.8	1.62	17	33	1.016	.487

.05) of data in all groups. Additionally, Levene's Test (Sig = .42 $>$ .05) confirmed that variances were equal in all groups. The results of Covariance Analysis were depicted in Table 4.

The initial row of Table 4 displays the corrected model which shows the sum of error squares without considering intercept. Regarding Adjusted R Squared = .796 and Sig = $<$ .001 $<$ .01, a significant and proper model was created. Moreover, if the value of the intercept is not considered zero, group with Sig. value $\approx$ .0 $<$ .01 affected the change of the average of the scores of students. Next, the Bonferroni Post-Hoc Test was computed to depict the significance of the differences among the various groups. The results of the Bonferroni Post-hoc Test were depicted in Table 5.

Based on the results displayed in Table 5, the mean score of students instructed in the BigBlueButton group is significantly 3.3 points (Sig $\approx$ .0 $<$ .01) greater than that of those instructed in the Control group and significantly 1.8 points (Sig $\approx$ .003 $<$ .01) higher than that of those instructed in the Face-to-Face group. In addition, the mean score of students instructed in the Face-to-Face group is significantly 1.5 points (Sig $\approx$ .007 $<$ 0.01) higher than that of those instructed in the Control group. Therefore, the kind of instruction in BigBlueButton and Face-to-Face compared to that in the Control group significantly affected students' writing self-efficacy. Additionally, the level of writing self-efficacy of students receiving instruction through BigBlueButton significantly (1.8 points) improved compared to those who received Face-to-Face instruction. Consequently, writing self-efficacy of Iranian EFL students receiving instruction through BigBlueButton and Face-to-Face differed significantly from those who received traditional instruction in the Control group.

To answer the second question, the K-S Test, descriptive analysis, Levene's Test, Covariance Analysis, and the Bonferroni Post-Hoc Test were calculated. The subsequent tables indicate the results of these tests. Table 6 indicates the results of descriptive analysis of students' writing self-efficacy scores in the Control group, Mind Dump, and Word Journal subgroups.

Table 6 indicated that the mean scores of EFL students' post-test writing self-efficacy in the Control group (M = 22.5), both experimental groups using Mind Dump (M = 25.6) and Word Journal (M = 24.2) are statistically different. In fact, EFL students' writing self-efficacy improved significantly after using these strategies in both experimental groups. But the average score of the students' writing self-efficacy slightly raised (.3 points) in the Control group. Furthermore, the K-S Test results confirmed normal distribution of data in the Control group, Mind Dump and Word Journal subgroups. Additionally, Levene's Test (Sig $\approx$ .43 $>$ .05) confirmed that variances were equal. Table 7 indicates the results of Covariance Analysis.

In the first row of Table 7, there is the corrected model which indicates the sum of error squares without considering intercept. Regarding Adjusted R Squared = .542 and Sig = $<$ .001, a significant and proper model was created. In addition, if the value of the intercept is not considered zero, formative assessment strategy with Sig. value = $<$ .001 $<$ .05 affected the change of the mean of the writing self-efficacy grades. Table 8 indicates the results of the Bonferroni Post-hoc Test.

Table 4. Results of covariance analysis model of students' post-test writing self-efficacy scores in control, Face-to-Face, and BigBlueButton groups.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	721.901[a]	3	240.634	116.860	$<$.001	.803
Intercept	142.551	1	142.551	69.228	$<$.001	.446
Pretest-Writing Self-efficacy	.745	1	.745	.362	.549	.004
Group	705.296	2	352.648	171.258	$<$.001	.799

R Squared = .803 (Adjusted R Squared = .796)

Table 5. Students' post-test writing self-efficacy scores in control, Face-to-Face, and BigBlueButton.

(I) Group	(J) Group	Mean Difference (I-J)	Std.Error	Sig.[b]
Control	Face-to-Face	-1.5*	.754	.007
	BigBlueButton	-3.3*	.904	$<$.001
Face-to-Face	BigBlueButton	-1.8*	.614	.003

*. The difference in mean is significant at the .05 level.

Table 6. Descriptive analysis pertaining to students' pre-test and post-test writing self-efficacy scores in control group, Mind Dump, and word journal subgroups.

Strategy	Test	N	Mean	Std. Deviation	Min	Max	Kolmogorov Smirnov Test	
							Statistic	Sig.
Control	Pre	30	22.2	1.18	14	28	1.201	.385
	Post	30	22.5	1.35	14	29	1.313	.206
Mind Dump	Pre	30	22.2	1.20	13	28	1.302	.306
	Post	30	25.6	1.65	17	33	1.216	.329
Word Journal	Pre	30	22.1	1.24	14	29	1.104	.441
	Post	30	24.2	1.51	15	31	1.316	.485

Table 7. Results of covariance analysis model of students' post-test writing self-efficacy scores in control group, Mind Dump, and word journal subgroups.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	198.724	3	66.241	36.130	<.001	.558
Intercept	99.838	1	99.838	54.454	<.001	.388
Pre-test Writing Self-efficacy	.524	1	.524	.286	.594	.003
Strategy	198.250	2	99.125	54.065	<.001	.557

R Squared = .558 (Adjusted R Squared = .542)

As shown in Table 8, the mean score of students who used Mind Dump in both Face-to-Face and BigBlueButton groups is significantly 3.1 points (Sig = $<$ .001 $<$ .01) higher than that of those who did not use this strategy in the Control group and significantly 1.4 points (Sig = .009 $<$ .01) higher than that of students who employed Word Journal in both experimental groups. Moreover, the average score of students who utilized Word Journal in Face-to-Face and BigBlueButton groups is significantly 1.7 points (Sig = .004 $<$ .01) higher than that of those who did not use it in the Control group. Therefore, it was revealed that using Mind

Dump and Word Journal in both Face-to-Face and BigBlueButton groups significantly affected students' writing self-efficacy compared to those in the Control group. Moreover, in comparison between Mind Dump and Word Journal, writing self-efficacy of students employing Mind Dump in both Face-to-Face and BigBlueButton groups significantly (1.4 points) improved compared to those who used Word Journal in Face-to-Face and BigBlueButton groups. Consequently, writing self-efficacy of Iranian EFL students who received Mind Dump compared to those who received Word Journal in Face-to-Face and BigBlueButton groups in total differed significantly from those who did not receive these strategies in the Control group.

To answer the third question, the K-S Test and descriptive statistics were computed. In addition, Levene's Test and Covariance Analysis were run. Table 9 illustrates the results of descriptive analysis..

Table 9 illustrates that the average scores of post-test writing self-efficacy of students who used Mind Dump in Face-to-Face (M = 24.7) and BigBlueButton (M = 26.5) are statistically different. The results indicate that EFL students' post-test writing self-efficacy scores in both groups (Face-to-Face and BigBlueButton) significantly improved compared to their pre-test ones. Moreover, the average score of students' implementing Mind Dump in BigBlueButton is significantly (1.8 points) higher than those who used Mind

Table 8. Students' post-test writing self-efficacy scores in control group, Mind Dump, and word journal subgroups.

(I) Group	(J) Group	Mean Difference (I-J)	Std.Error	Sig.[b]
Control	Mind Dump	-3.1*	.956	<.001
	Word Journal	-1.7*	.635	.004
Mind Dump	Word Journal	1.4*	.607	.009

*. The difference of mean is significant at the .05 level.

Table 9. Descriptive analysis pertaining to students' pre-test and post-test writing self-efficacy scores using Mind Dump in Face-to-Face and BigBlueButton groups.

Group	Test	N	Mean	Std. Deviation	Min	Max	Kolmogorov Smirnov Test	
							Statistic	Sig.
Face-to-Face	Pre	15	22.1	1.13	14	29	1.201	.343
	Post	15	24.7	1.75	16	30	1.095	.456
BigBlueButton	Pre	15	22.3	1.17	13	28	1.194	.361
	Post	15	26.5	1.81	16	33	1.216	.319

Dump in Face-to-Face. Furthermore, the significance values of the K-S Test in Face-to-Face and BigBlueButton groups are greater than 0.05. Thus, it shows a normal distribution pattern for the pre-test and post-test grades across Face-to-Face and BigBlueButton groups. Additionally, Levene's Test (Sig $\approx .745 > .05$) confirmed variances were equal. Table 10 presents the effect of Mind Dump in Face-to-Face and BigBlueButton groups on EFL students' writing self-efficacy based on Covariance Analysis Model.

The topmost row of Table 10 illustrates there is the corrected model which indicates the sum of error squares without considering intercept. Regarding Adjusted R Squared = .423 and Sig = $< .001$, a significant and proper model was created. Moreover, if the value of the intercept is not considered zero, group with Sig. value = $< .001$ affected the change of the mean scores. Therefore, it can be concluded that using Mind Dump strategy in Face-to-Face and BigBlueButton groups significantly influenced students' writing self-efficacy. Moreover, the writing self-assurance observed in students who implemented Mind Dump in BigBlueButton significantly (1.8 points) improved when compared to their counterparts in Face-to-Face. Consequently, writing self-efficacy of Iranian EFL students who received Mind Dump through BigBlueButton differed significantly from their counterparts in Face-to-Face.

To answer the fourth research enquiry, the K-S Test and descriptive statistics were computed. In addition, Levene's Test and Covariance Analysis were run. The following tables present the results of these tests.

Table 11 illustrates the average scores of post-test writing self-efficacy of students who implemented Word Journal in Face-to-Face (M = 23.3) and BigBlueButton (M = 25.1) are statistically different. It also indicates EFL students' post-test writing self-efficacy scores in both groups improved compared to their pre-test ones. Moreover, the mean score of students implementing Word Journal in BigBlueButton is significantly (1.8 points) higher than those who used Word Journal in Face-to-Face. Furthermore, the significance values of the K-S Test in Face-to-Face and BigBlueButton groups are greater than 0.05. Thus, it shows a normal distribution for pre-test and post-test grades within each group. Additionally, Levene's Test (Sig $\approx .143 > .05$) proved that variances were equal. Table 12 presents the effect of Word Journal in Face-to-Face and BigBlueButton groups on EFL students' writing self-efficacy based on Covariance Analysis Model.

The topmost row Table 12 illustrates there is the corrected model which indicates the sum of error squares without considering intercept. Regarding Adjusted R Squared = .152 and Sig = $.041 < .05$, a significant and proper model was created. On the other hand, if the value of the intercept is not considered zero, group with Sig = $.015 < .05$ affected the change of the students' mean scores. Therefore, it is concluded that using Word Journal in Face-to-Face and BigBlueButton groups significantly affected students' writing self-efficacy. Moreover, the writing self-efficacy demonstrated by students who applied Word Journal in BigBlueButton significantly (1.8 points) improved compared to those who used Word Journal in Face-to-Face. Consequently, writing self-efficacy of Iranian EFL students who

Table 10. Results of covariance analysis of post-test writing self-efficacy scores of students using Mind Dump in Face-to-Face and BigBlueButton groups.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	55.949	2	27.975	11.617	<.001	.463
Intercept	79.365	1	79.365	32.958	<.001	.550
Pretest-Writing Self-efficacy	5.249	1	5.249	2.180	.151	.075
Group	47.140	1	47.140	19.576	<.001	.420

R Squared = .463 (Adjusted R Squared = .423)

Table 11. Descriptive analysis pertaining to pre-test and post-test writing self-efficacy scores of students using word journal in Face-to-Face and BigBlueButton groups.

Group	Test	N	Mean	Std. Deviation	Min	Max	Kolmogorov Smirnov Test	
							Statistic	Sig.
Face-to-Face	Pre	15	22.3	1.16	14	29	1.181	.394
	Post	15	23.3	1.68	15	30	1.147	.403
BigBlueButton	Pre	15	21.9	1.19	14	28	1.152	.381
	Post	15	25.1	1.77	16	32	1.256	.345

Table 12. Results of covariance analysis of post-test writing self-efficacy scores of students using word journal in Face-to-Face and BigBlueButton groups.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	23.338	2	11.669	3.602	.041	.211
Intercept	42.403	1	42.403	13.090	.001	.327
Pretest-Writing self-efficacy	.805	1	.805	.248	.622	.009
Group	21.832	1	21.832	6.740	.015	.200

R Squared = .211 (Adjusted R Squared = .152)

received Word Journal through BigBlueButton differed significantly from those in Face-to-Face.

Discussion

This investigation examined the effect of BigBlueButton and formative assessment strategies (Mind Dump and Word Journal) on Iranian EFL students' writing self-efficacy. To investigate the first research question, the K-S Test was calculated to determine the normality of data distribution. Additionally, descriptive statistics, Levene's Test, Covariance Analysis, and the Bonferroni Post-Hoc Test were calculated. The results demonstrated writing self-efficacy of individuals who received instruction through BigBlueButton and Face-to-Face improved significantly compared to those who received traditional instruction in the Control group. Additionally, writing self-efficacy of students who received instruction through BigBlueButton significantly improved compared to those who received Face-to-Face instruction. This discovery reinforces the notion that implementing online platforms like BigBlueButton can boost individuals' writing self-efficacy. The study's results correspond with the findings of (Alberth, 2019; Li, 2023; Rahimi & Fathi, 2021) which highlighted the role of online environment in improving students' self-assurance in writing capabilities. Moreover, the results of the study are in harmony with the findings of Salajeghe and Hasani (2022) who found that online learning method had a positive effect on the EFL students' writing achievement and their self-concept.

In line with Li (2023) and Rahimi and Fathi (2021), it is possible to discuss that the online settings may present avenues for synchronous interaction, cooperation, modification, and constructive feedback, raising the self-assurance and writing capabilities of EFL students. According to Lee and Evans (2019), comments and constructive feedback on learners' writing assignments might have improved learners' writing self-efficacy. It is essential to highlight that learners can provide suggestions and feedback to peers, thereby boosting their self-assurance in their own ability to generate quality work (Li, 2023). Thus, the online environment can enhance confidence of learners in their own capability to produce writing tasks.

From a wider perspective, the study's results reinforce prior studies which have demonstrated how the implementation of technology can improve students' self-efficacy in their writing capabilities (Rahimi & Fathi, 2021). Actually, it can be discussed that the application of online platforms like BigBlueButton fostered a user-centric atmosphere that can assist students to feel confidence in their writing capabilities. Next, digital platforms generally provide interactive features including real-time feedback, breakout rooms, and polls which can boost student involvement and participation (Ukoh, 2021), thereby contributing to an enhancement in individuals' self-assurance. Additionally, online education provides better access to an assortment of resources and tools aimed at enhancing students' writing performance, thereby fostering a more enriched learning atmosphere which may bolster students' writing self-efficacy. Actually, the adaptability of online learning empowers students to advance at a pace that is comfortable for them (Cizmesija & Bubas, 2020). In fact, it provides a more personalized learning which can promote a stronger feeling of accomplishment; as a result, it can improve students' self-efficacy. Furthermore, studying in a familiar online setting can alleviate anxiety for some students, enabling them to articulate themselves more openly, which can promote their confidence in writing (Li, 2023). Finally, digital platforms enable peer evaluation and collaboration in writing, motivating students to exchange ideas and receive constructive feedback which boost students' confidence in writing (Rahimi & Fathi, 2021). Regarding BigBlueButton, the functionalities of this platform aid in improving student performance (Ukoh, 2021). Since BigBlueButton provides students with the flexibility to study from anywhere, students who use it may perform better academically (Kumar et al., 2021). In conclusion, the combination of real-time and supportive environment, interaction and participation, access to resources, personalized learning, reduced anxiety, and constructive feedback and peer collaboration may contribute to a notable improvement in writing self-efficacy of students who received instruction through BigBlueButton compared to those who received instruction in Face-to-Face and those who received traditional instruction in the Control group.

With respect to formative assessment strategies, due to the limited research regarding the impact of Mind Dump and Word Journal on Iranian EFL students' writing self-efficacy, this investigation explored the potential of the above-mentioned formative assessment strategies to enhance EFL students' writing self-efficacy. To investigate the second, third, and fourth research inquiries, the K-S Test was calculated to indicate normal distribution of data. In addition, descriptive statistics, Levene's Test and Covariance Analysis were run. Regarding the second research question, the Bonferroni Post-Hoc Test was calculated, as well. It is important to mention that because the above-mentioned research questions are related to each other and they cannot be separated, they are discussed together in one part.

The results indicated the level of writing self-efficacy of students who received Mind Dump compared to those who received Word Journal in both experimental groups differed significantly from those who did not receive these strategies in the Control group. Moreover, it was indicated that using Mind Dump and Word Journal in Face-to-Face and BigBlueButton groups significantly impacted students' writing self-efficacy. Additionally, writing self-efficacy of students who implemented Mind Dump and Word Journal in BigBlueButton significantly improved when compared to their counterparts in Face-to-Face.

Black and Wiliam (1998) asserted when formative assessment is implemented in classroom instruction, it may result in great student achievement. They continued that this assessment is used throughout the entire learning process to enhance those who are engaged in the education. Therefore, formative assessment is vital for successful teaching and learning. Another important variable, i.e. students' self-efficacy, is the students' confidence to achieve a special goal (Bandura & Locke, 2003). According to Pajares (2003), students with elevated self-assurance tend to demon-

strate enhanced performance levels. Hence, the conclusions drawn from this study are congruent with the empirical study executed by Baleghizadeh and Masoun (2014) who found that using self-assessment on a formative basis developed EFL students' self-efficacy after receiving treatment. Additionally, the results correspond with those drawn by Butler and Lee (2010), who demonstrated that students' capability to evaluate their own function on a formative basis enhanced their performance and self-efficacy. Furthermore, the results are in harmony with the finding of Fathi et al. (2021) who demonstrated not only self-assessment but also peer-assessment practices significantly improved EFL individuals' writing self-efficacy.

On the other hand, this study's results differ from those drawn by Meusen-Beekman et al. (2016) who demonstrated the level of self-efficacy is not quite affected by self-assessment and peer-assessment. Nevertheless, an additional regression analysis indicated that formative assessment affected self-efficacy, though the variance was rather low. They pointed out that in order for more students to achieve mastery experience, the formative assessment strategies given to the learners should have provided more challenging tasks.

In this study, formative assessment strategies (Mind Dump and Word Journal) were employed based on the fact that implementing formative assessment techniques contributes learners recognize and identify their strengths and weaknesses which can boost certain areas of their performance. In addition, the delivery of feedback to students, along with engagement in their learning is important for enhancing their self-efficacy levels. Drawing from the conclusions of the present research, regular implementation of formative assessment strategies improved students' writing self-efficacy levels. It should be noted employing Mind Dump and Word Journal and receiving feedback not only enhanced interaction between the instructor-student and student-student, but also developed students' performance and writing self-efficacy. Moreover, implementing formative assessment practices such as Mind Dump and Word Journal motivated students to articulate their thoughts without the apprehension of making mistakes that increased their confidence in writing. Next, they allowed students to engage in reflection on their educational experiences, aiding them in the identification of their accomplishments and challenges. This process might raise their self-efficacy. Finally, consistent application of formative assessment strategies enabled students to cultivate their language abilities systematically which might lead to a greater confidence in their potentiality to succeed. To sum up, the integration of learning experiences, receiving feedback, engagement, reflection, and skill development can support and build students' confidence in their performance and self-efficacy.

Conclusion and implications

This investigation focused on the effect of BigBlueButton, Mind Dump, and Word Journal on Iranian EFL students' writing self-efficacy. It was demonstrated writing self-efficacy of individuals receiving instruction through BigBlueButton and Face-to-Face improved significantly compared to those who received traditional instruction in the Control group. Additionally, writing self-efficacy of students who received instruction through BigBlueButton significantly (1.8 points) improved compared to those who received Face-to-Face instruction. Next, it was revealed that using Mind Dump and Word Journal in both experimental groups significantly impacted students' writing self-efficacy compared to those who did not receive Mind Dump and Word Journal in the Control group. Moreover, it was demonstrated writing self-efficacy of students who used Mind Dump in both Face-to-Face and BigBlueButton groups significantly (1.4 points) improved compared to writing self-efficacy of students who used Word Journal in Face-to-Face and BigBlueButton groups. Finally, it was revealed writing self-efficacy of students who applied Mind Dump and Word Journal strategies in BigBlueButton significantly improved compared to those who used these strategies in Face-to-Face.

These results might have significant implications for language teachers. By providing teachers with insights into effective strategies, it may help them adopt methods that improve student engagement and learning outcomes. Moreover, the results may motivate policy makers to update and revise EFL instruction, promote more effective integration of technology and adopt innovative strategies to satisfy Iranian students' requirements.

One the other hand, this investigation is subject to some restrictions or limitations. It included a finite number of EFL students, all of whom were at an identical proficiency level. It is suggested that future researcher explore EFL students across various proficiency levels and utilize more participants to augment the generalizability of their results. Furthermore, while the small group of EFL students significantly deepened our understanding of positive effect of BigBlueButton and formative assessment strategies on writing self-efficacy levels of Iranian students, it cannot be definitively ascribed all the improvement solely to BigBlueButton and formative assessment strategies, because time may have contributed to this progress to some degree. Therefore, establishing clear evidence of cause and effect is challenging. And it is suggested that other researchers in this area conduct a longitudinal study with more participants. It is worth noting while further investigation is essential to clarify the exact effect of BigBlueButton and formative assessment strategies (Mind Dump and Word Journal) on students' writing self-efficacy, these results presented significant and perceptive recommendations for the progression of future research and the implementation of this platform in language learning.

Authors contributions
All authors have contributed equally to prepare the paper.

Availability of data and materials
The data that support the findings of this study are available from the corresponding author, upon reasonable request.

Conflict of interests
The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix: Second Language Writing Self-Efficacy Scale

First Name: Last Name:

1. I feel confident about writing in English.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

2. I know how to write well in English.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

3. I write in English with an underlying logical organization.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

4. If I put in the needed effort, I am sure I can become a good writer in English.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

5. I can write essays that are relevant and appropriate to the assignment.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

6. I present my point of view or arguments accurately and effectively when writing in English.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

7. I am sure I can do well on writing courses even if they are difficult.

1. Strongly disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly agree

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