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Research Article

Examining the Utility of Incorporating Collaborative Programming and Self-Scaffolding into Contextualizing Educational Implication Strategy for Improving EFL Learners' Writing Ability

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ABSTRACT

This study examined the effects of incorporating contextualizing educational implication strategy into collaborative programming and self-scaffolding on Iranian EFL learners' writing ability. To this end, the researchers selected 28 male EFL learners in two intact classes of a language institute in Shiraz (Iran) as the participants and used a quasi-experimental design to carry out the study. That is, they assigned the participants to two experimental groups, including contextualizing-collaborative-programming group and contextualizing-self-scaffolding group. Moreover, they used a writing pretest, 10 treatment sessions, and a writing posttest to gather the data. Finally, they analyzed the data on SPSS 25 using independent-samples and paired-samples t-tests. Based on the results, while both of the instructional treatments were effective in improving the participants' writing ability, contextualizing-collaborative-programming proved to be more efficacious in this study. The results can provide teacher educators and syllabus designers with guidelines on the uses of educational implication strategies and sociocultural language instruction in foreign language contexts.

Introduction

The review of the empirical studies in the field of language instruction (e.g. Bjorklund & Causey, 2017; Fazilatfar et al., 2017; Furth, 1969; Lourenço, 2012; Mayer, 2004; Paivio, 2006) shows that *constructivism* has been a recurrent research line. As van Compernolle and Williams (2013) noted, constructivism constitutes the approach to language instruction that gives priority to learners' construction of meaning in the process of language learning.

Richardson (1997) itemized two main branches of constructivism, including cognitive constructivism and social constructivism. Piaget (1971) developed cognitive constructivism and argued that it highlights the role of learners' cognitive development in their capability to process and acquire new knowledge, including language knowledge. On the other hand, Vygotsky (1962) developed social constructivism and stated that in this theory, learners' acquisition of new knowledge, including language knowledge, depends on their social interaction with experts and their peers.

Some researchers (e.g., Prayekti, 2016) have translated Piaget's (1971) theory of cognitive constructivism into classroom practice by introducing educational implication strategies. These strategies refer to the measures that are taken by the syllabus designers and language teachers to adapt teaching materials and the process of language teaching to the learners' cognitive development. Among these strategies, modeling has been extensively investigated (Sujito et al., 2019) in language instruction. Modeling refers to the process of facilitating the learners' task performance by providing them with models (Alalouch, 2021).

A number of researchers (e.g., Zheng, 2016) have tried to improve the utility of educational implication strategies by integrating them with social-constructivism-informed techniques, including collaborative programming and self-scaffolding. In collaborative programming, learners are prompted to develop plans for performing tasks by collaborating with their peers. On the other hand, in self-scaffolding, language learners are provided with the opportunity to formulate language-learning plans, to implement them in order to promote their language acquisition, and to evaluate their performance based on the objectives of their developed plans (De Guerrero & Villamil, 2000).

Review of the Related Literature

Educational Implication Strategies

Piaget (1971) introduced the notion of educational implication as a main aspect of his cognitive development theory. This notion constitutes the translation of the relevant theory into second language classroom practices (Lourenço, 2012). According to Sadler (1999), educational implication highlights the need for ensuring the congruence between language learners' cognitive development and the content of instructional materials. As Prayekti (2016) explained, it shows that the learners' development of certain cognitive capabilities is the prerequisite to their ability to process, analyze, and acquire second language knowledge.

A number of researchers have made an effort to particularize educational implication strategies in language instruction. In this regard, Sujito (2020) argued that modeling and contextualizing constitute the main strategies that are utilized in the process of language acquisition. Alalouch (2021) defined modeling as the strategy that provides the learners with a model of task performance using materials such as audio-visual materials and makes them cognizant of the task performance stages. Moreover, Prayekti (2016) argued that contextualizing encompasses the strategy that empowers the learners to use instructional

materials for relating the new language knowledge to their background knowledge. Prayekti (2016) concluded that modeling and contextualizing strategies may interact with the techniques of the sociocultural theory of language learning, including scaffolding and collaborative programming.

Scaffolding and Collaborative Programming

The technique of scaffolding constitutes one of the main techniques of language learning in sociocultural theory (Poehner & Lantolf, 2021). Xi and Lantolf (2020) argued that scaffolding refers to the more proficient language users' assistance that enables the language learners to perform tasks that cannot be performed by themselves due mainly to their inadequate language processing capacity. They itemized three main types of scaffolding in the process of language learning including:

a) social scaffolding that refers to the kind of assistance which empowers the learners to take part in second language conversations and helps them to perform different speech acts in the process of conversation;

b) cognitive scaffolding that encompasses the scaffolding practices which help the groups of language learners to deal with second language problem-solving tasks;

c) metacognitive scaffolding which comprises the scaffolding technique that helps the learners to develop and implement language learning plans and to evaluate their second language performance.

Nonetheless, as they pointed out, the learners can also take advantage of self-scaffolding without being dependent on the other language users' assistance. In the process of self-scaffolding, the language learners are provided with the opportunity to formulate language-learning plans, to implement them in order to promote their language acquisition, and to evaluate their performance based on the objectives of their developed plans (De Guerrero, & Villamil, 2000). As Xi and Lantolf (2020) noted, scaffolding is closely associated with *collaborative programming* in language classrooms.

Collaborative programming constitutes a sociocultural language learning technique that takes advantage of pair or group planning for ameliorating the language learners' acquisition of the various aspects of the target language (Poehner & Lantolf, 2021). In this technique, the learners are prompted to work in pairs or to collaborate with their group members in order to develop plans for performing second language tasks (Guk & Kellogg, 2007). This technique enables the learners to develop a collective understanding of the various types of language learning problems and to find effective solutions to them in the process of task performance (Poehner & Lantolf, 2021).

The interest in the above-mentioned techniques has motivated researchers to examine their utility in the context of the classroom. In this regard, Radford et al. (2014) examined the degree to which self-scaffolding influenced the ESL learners' language achievement. The participants were a group of ESL learners at a language institute. A quasi-experimental design was used for conducting the study. Based on the results, self-scaffolding significantly improved the participants' language achievement in the context of the classroom. In addition, Prayekti (2016) examined the degree to which the modeling educational implication strategy influenced the intermediate-level learners' planning ability. The researcher used a quasi-experimental design to conduct the study. The participants were a group of ESL learners at a senior high school. Based on the results, the modeling strategy had a beneficial impact on the learners' planning ability in their relevant setting. Likewise, Lin et al. (2018) made an effort to determine the degree to which the language learners' use of Wiki ameliorated their

collaborative programming ability. The participants were a large group of intermediate-level ESL learners. The researchers used a quasi-experimental design to carry out their study. The results indicated that Wiki significantly improved the participants' collaborative programming. Finally, Sujito et al. (2019) examined the degree to which analogy and contextualizing techniques affected the EFL learners' writing ability. A mixed-methods design was used for conducting this study. The participants of the study were a group of EFL learners at two universities. On the basis of the results, the abovementioned strategies significantly ameliorated the learners' writing ability. As Xi and Lantolf (2020) concluded, self-scaffolding and collaborative programming techniques may have a beneficial impact on the learners' performance of writing tasks.

Second Language Writing

Writing is regarded as an essential skill in academic contexts. The importance of this skill stems from the fact that it is the primary and most significant way of disseminating information about research findings across the world (Zhang & Lu, 2022). This skill involves the language learners' ability to take advantage of their knowledge of language forms including the various types of individual and phrasal vocabulary items and grammatical structures, along with their functions to communicate their intended meanings by means of written second language discourse (Li & Huang, 2022).

In the field of SLA, a certain group of writing studies has focused on the learners' performance on the writing tasks of international proficiency tests, including IELTS among others. Van Waes and Leijten (2015) distinguished the writing tasks of IELTS Academic from the writing tasks of IELTS General Training. According to them, the writing tasks of IELTS Academic focus on the language learners' capability to perform writing tasks in educational settings including the language classrooms. Nonetheless, the writing tasks of IELTS General Training focus on the learners' ability to perform real-world writing tasks that are considered to be the essential requirements of migration. As they concluded, there is a need for more empirical studies to determine the efficient IELTS writing preparation instructional techniques.

The Present Study

In the field of language teaching, researchers have focused on certain lines of research on educational implication strategies and have disregarded others. First, very few studies have focused on the educational implication strategies (e.g., Prayekti, 2016), collaborative programming (e.g., Lin et al., 2018), and self-scaffolding (e.g., Radford et al., 2014). Second, the relevant studies of the educational implication strategies (e.g., Sujito et al., 2019) have made an effort to determine their utility for improving the learners' language acquisition without examining the interaction effect between them and the sociocultural instructional techniques including collaborative programming among others. Finally, the studies of educational implication strategies (Alalouch, 2021) and sociocultural language teaching techniques (e.g., Nassaji, & Swain, 2010) have not dealt with the learners' writing ability in a satisfactory way.

The above-mentioned issues in the research on the contextualizing educational implication strategy and collaborative programming and self-scaffolding highlight the fact that there is a need for more empirical research on these variables in the second and foreign language learning contexts including the EFL context of Iran.

The present study made an endeavor to deal with the lack of information on the utility of contextualizing educational implication strategy

and collaborative planning, and self-scaffolding sociocultural techniques for teaching second language writing in the foreign language context of Iran. More specifically, the study aimed to answer the following research questions:

RQ1: Does the interaction of contextualizing as the educational implication strategy and collaborative programming have a significant effect on the development of the writing ability of Iranian EFL learners?

RQ2: Does the interaction of contextualizing as the educational implication strategy and self-scaffolding have a significant effect on the development of the writing ability of Iranian EFL learners?

RQ3: Are there any significant differences between the interaction effects of contextualizing and collaborative programming and contextualizing and self-scaffolding on the development of the writing ability of Iranian EFL learners?

Method

Participants

Considering the aforementioned objectives of the study, the researchers used convenience sampling to select 28 intermediate-level male EFL learners in two intact classes (i.e., 14 learners in each class) of a private language institute in Shiraz (Iran) as the participants. They used the Oxford Placement Test (OPT) (Allan, 2004) to ensure the homogeneity of the selected learners. These participants were native speakers of Farsi and ranged in age from 16 to 23. Furthermore, they were selected from among the learners who had received 2 to 3 years of general English instruction at the pertinent language institute.

Materials and Instruments

The researchers used the following materials and instruments to conduct the present study:

Proficiency Test

Given the intentions of the study, the researchers used OPT (Allan, 2004) to select the intermediate-level participants of the study. This test encompasses three main sections including *close test, grammar*, and *vocabulary*. Each of the aforementioned sections comprises 20 multiple-choice items. As Allan (2004) noted, the reliability and validity indices of this test are satisfactory. Nonetheless, the researchers used Cronbach's Alpha (CA) measure of internal consistency in order to determine the reliability of this test in the EFL context of Iran in a pilot study that involved 15 EFL learners who were similar to the participants in terms of their characteristics. Based on the obtained results, the reliability of this test was .89, and it could be used in the EFL context of Iran.

Writing Pretest and Posttest

In this study, the researchers used *IELTS Academic writing task 2* as a writing pretest and a writing posttest in order to examine the participants' writing ability prior to the onset of the treatment sessions and subsequent to their termination. This writing task is one of the two writing tasks of IELTS Academic that is developed by the *Cambridge Assessment English* organization. An examination of the instructions of this writing task indicates that it constitutes a free writing task which prompts the IELTS candidates to offer their perspectives on a certain problem or point of view. Consequently, the respondents may be asked to find a solution to a certain problem, offer logical opinions on specific issues, or compare and contrast various viewpoints among others. In the present study, the participants took the writing pretest and posttest in a 50-minute period.

Writing Assessment Framework

In order to assess the participants' writing performance on the writing pretest and posttest of the study, the researchers utilized *Standard IELTS Writing Assessment Framework,* which has been developed by Cambridge Assessment English

organization. This framework enables the raters to assess the IELTS candidates' writing ability based on four main criteria including *task response, coherence and cohesion, lexical resources*, and *grammatical range and accuracy*. The examination of these criteria highlights the fact that the task response criterion refers to the degree to which the candidates are able to address the relevant tasks in terms of their requirements. Moreover, the cohesion and coherence criterion refers to the learners' ability to deal with the organization of their writing tasks and to use the linking devices and referencing. Furthermore, the lexical resources criterion encompasses the learners' ability to use a wide range of vocabulary items along with their capability to deal with spelling and word formation issues. Finally, the grammatical range and accuracy criterion comprises the learners' ability to use a wide range of complex sentences in an accurate way. Each of these criteria enables the raters to assess the learners' writing performance by assigning band scores to their writing ability. These band scores range from 4 to 8. In this study, in order to determine the participants' total writing score, the band scores of these criteria were added together and divided by 4. Nonetheless, the researchers multiplied the summed scores by 10 and divided the results by 40 in order to facilitate the process of comparison between the mean scores and to provide a more vivid picture of writing performance results. Consequently, the highest and the lowest writing scores were 80 and 40, respectively. Lastly, the researchers took advantage of inter-rater correlation coefficient in order to determine the inter-rater reliability in the present study. Based on the results, this coefficient was acceptable on the pretest (.82) and the posttest (.84). As a result, the pretest and posttest results were satisfactorily reliable in this study.

Video Clips

In the present study, the researchers used ten 15-minute video clips, which had been developed by British Council, in the treatment sessions of the experimental groups of the study. These video clips focused on the contextualizing educational implication strategy. The examination of the content of these video clips highlighted the fact that they could be classified into five main categories including the task response, cohesion, coherence, lexical resources, and grammatical range and accuracy categories. Two of the above-mentioned ten video clips focused on each of these categories. In each treatment session, first, the researchers played the relevant video clip. Second, they asked each of the experiential groups to perform the relevant writing task of the session with the help of the educational implication strategies of the pertinent video clip.

Procedure

In the present study, first, the researchers used convenience sampling in order to select 28 intermediate-level male EFL learners in two intact classes (i.e., 14 learners in each class) of a private language institute in Shiraz (Iran) as the participants. Second, they used OPT (Allan, 2004) to ensure the homogeneity of the selected participants. Third, the researchers obtained written informed consent from all of the participants prior to the onset of the treatment. Fourth, they randomly assigned the classes to two group categories including Contextualizing Collaborative-Programming (CCP) group and Contextualizing-Self-Scaffolding (CSS) group. Fifth, the researchers administered the writing pretest of the study to both of the groups in order to ensure their homogeneity in terms of their writing ability and to determine their writing ability before the onset of the treatment sessions

Sixth, during the treatment of the study, each of the experimental groups was provided with its

pertinent educational implication strategy treatment for 10 sessions during a five-week period of time (i.e., two sessions per week). More specifically, in the CCP group, the researchers played the video clips that focused on the contextualizing educational implication strategy. Moreover, they asked the learners to collaborate with their group members (in four-member small groups) to develop a plan for performing the writing task of the relevant session and to implement it in the process of their task performance using the contextualizing strategy. In the CSS group, the researchers played the video clips that informed the learners about the contextualizing educational implication strategy. Furthermore, they prompted the learners to formulate language-learning plans, to implement them in order to promote their language acquisition, and to evaluate their performance based on the objectives of their developed plans. Table 1 provides the lesson plan of the first treatment session of CCP:

Table 1

Lesson Plan of CCP

Treatment Stage	Description
Video clip	Watch the 15-minute video clip about task response in order to link new information on wring to your background knowledge
Plan	Collaborate with your group members in order to develop a plan for performing your writing task on the following topic: Can university students use AI for improving their writing skills? Argue whether AI can be used as an educational aid in academic settings.
Implementation	Take advantage of your group members' support to implement the plan and to use task response-based information to write, revise, and complete your writing task

Furthermore, Table 2 shows the lesson plan of the third treatment session of CSS:

Table 2

Lesson Plan of CSS

Treatment Stage	Description
Video clip	Watch the 15-minure video clip about coherence and cohesion aspect of second language writing
Plan	Take advantage of your inner resources including your organizational skills to develop a plan for performing a writing task on the following topic: Will scientists be able to treat cancer? Explore the arguments for and against scientists' ability to deal with serious health issues in the near future.
Implementation	Use your plan to complete your writing task by ensuring the coherence and cohesion of your completed task and evaluate your performance based on the new writing-based information in the video clip

Seventh, the researchers administered the writing posttest of the study to both of the groups subsequent to the termination of the treatment sessions to determine the effectiveness of the

educational implication strategy instruction. Eighth, in order to assess the participants' writing performance on the writing pretest and posttest of the study, the researchers utilized Standard IELTS Writing Assessment Framework. Lastly, the researchers used SPSS 25 to perform the data analysis of the present study.

Design

The present study used the quasi-experimental design to answer the research questions. Mackey and Gass (2016) averred that this design enables the researchers to examine the effects one or more independent variables on one or more dependent variables. Moreover, it is distinguished from the experimental design due mainly to its lack of random assignment of the participants to the groups of the study. Likewise, in the present study, the researchers made an effort to examine the effects of two independent variables including interaction of contextualizing as the educational implication strategy and collaborative programming and interaction of contextualizing as the educational implication strategy and self-scaffolding, on one dependent variable which was EFL learners' writing ability. In addition, they were not able to randomly assign participants to the groups of the study and used intact classes as the groups of the present study.

Data Analysis

Considering the main objectives of the study, the researchers used descriptive statistics including Mean (M), Standard Deviation (SD), and Standard Error of the Mean (SEM) values along with inferential statistics including paired-samples t-test and independent-samples t-test in order to perform the data analysis of the present study.

Results

Based on the aims of the study, first, the researchers examined the characteristics of the data in order to select the appropriate statistical tests for analyzing the data. The preliminary analysis showed that the data did not violate the assumptions of the parametric tests since they were interval data and were collected independently. Moreover, they were normally distributed based on the results of Kolmogorov-Smirnov and Shapiro-Wilk tests. Table 3 and Table 4 provide the results of these normality tests for the performances of CCP group and CSS group on the writing pretest and posttest of the study:

Table 3

Normality Tests of Pretest Performances

	Kolmogorov-Smirnov			Shapiro-Wilk		
Groups	Statistic	df	Sig.	Statistic	df	Sig.
CCP	.103	14	.200	.966	14	.817
CSS	.150	14	.200	.956	14	.657

Table 4

Normality Tests of Posttest Performances

	Kolmogorov-Smirnov			Shapiro-Wilk		
Groups	Statistic	df	Sig.	Statistic	df	Sig.
CCP	.110	14	.200	.980	14	.975
CSS	.226	14	.200	.912	14	.168

According to Table 3 and Table 4, the p-values (marked as Sig.) in the results of Kolmogorov–Smirnov and the Shapiro–Wilk tests were larger than .05. Consequently, the data were normally distributed. Therefore, the researchers used the paired-samples t-test and the independent-samples t-test to analyze the data. Before answering the research questions, the researchers examined the performances of both groups on the writing pretest to ensure their homogeneity in terms of their writing ability. Table 5 shows the results of this comparison:

Table 5

Pretest Performances of CCP and CSS Groups

Groups	N	M	SD	SEM
CCP	14	48.36	3.713	.992
CSS	14	50.29	6.044	1.615

The researchers used an independent-samples t-test to determine the significance of the pretest performance difference. Table 6 shows the results of this test:

Table 6

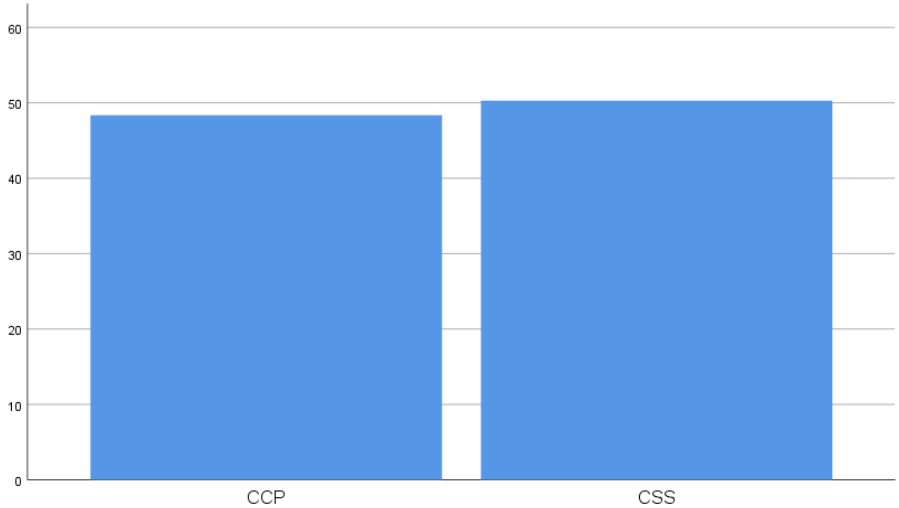
The t-test of Pretest Performances of CCP and CSS Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Equal variances assumed	2.428	.131	-1.017	26	.318	-1.929	1.896	-5.825	1.968
Equal variances not assumed			-1.017	21.589	.320	-1.929	1.896	-5.864	2.007

According to Table 4, the result of the t-test was not significant (t (26) = -1.017, p=.318, η2=.006). As a result, there was not a significant difference between the pretest performances of the groups, and they were homogeneous in terms of their writing ability. Figure 1 shows these results:

Figure 1

Pretest Performances of CCP and CSS Groups



The following section answers the research questions of the study based on the results of data analysis:

RQ1: Does the interaction of contextualizing as the educational implication strategy and collaborative programming have a significant effect on the development of the writing ability of Iranian EFL learners?

Based on the aim of this question, the researchers compared the performances of CCP group on the writing pretest and posttest of the study. Table 7 shows the relevant results:

Table 7

Pretest and Posttest Performances of CCP Group

	M	N	SD	SEM
CCP Pretest	48.36	14	3.713	.992
CCP Posttest	68.14	14	4.185	1.119

The researchers utilized a paired-samples t-test to examine the significance of the difference between the performances of this group on the writing pretest and posttest. Table 8 provides these results:

Table 8

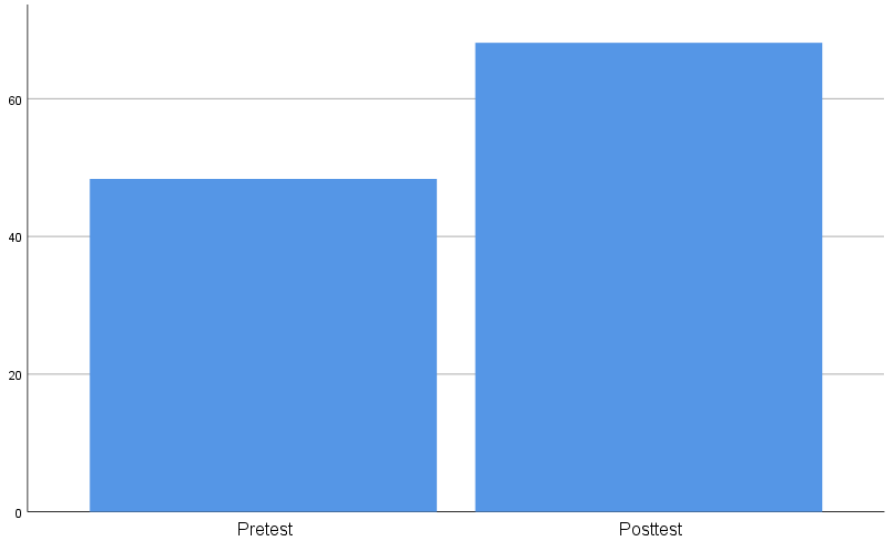
The t-test of Pretest and Posttest Performances of CCP Group

	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	M	SD	SEM	Lower	Upper			
Pretest - Posttest	-19.786	5.132	1.372	-22.749	-16.823	-14.426	13	.000

Based on Table 6, there was a significant difference between the performances of this group on the writing pretest and posttest (t (13) =-14.426, p=.000, η2=.127). Therefore, it can be argued that there was a significant improvement in its writing ability after the treatment sessions of the present study. Figure 2 provides these results:

Figure 2

Pretest and Posttest Performances of CCP Group



RQ2: Does the interaction of contextualizing as the educational implication strategy and self-scaffolding have a significant effect on the development of the writing ability of Iranian EFL learners?

The researchers compared the performances of CSS group on the writing pretest and posttest to answer this question. Table 9 shows the results of this comparison:

Table 9

Pretest and Posttest Performances of CSS Group

	M	N	SD	SEM
CSS Pretest	50.29	14	6.044	1.615
CSS Posttest	63.57	14	4.033	1.078

A paired-samples t-test was used to determine the significance of the difference between the performances of this group on the writing pretest and posttest. Table 10 shows these results:

Table 10

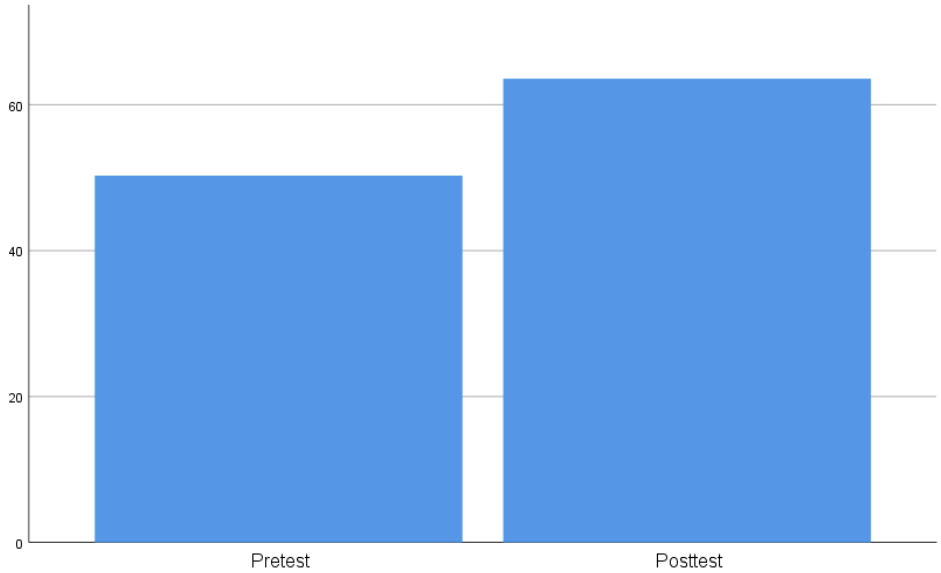
The t-test of Pretest and Posttest Performances CSS Group

	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	M	SD	SEM	Lower	Upper			
Pretest - Posttest	-13.286	4.953	1.324	-16.145	-10.426	-10.037	13	.000

As shown in Table 8, there was a significant difference between the performances of this group on the writing pretest and posttest (t (13) = -10.037, p=.000, η2=.118). That is, there was a significant improvement in its writing ability after the treatment sessions of the present study. Figure 3 shows these results:

Figure 3

Pretest and Posttest Performances of CSS Group



RQ3: Are there any significant differences between the interaction effects of contextualizing and collaborative programming, and contextualizing and self-scaffolding on the development of the writing ability of Iranian EFL learners?

Based on the aim of this question, the researchers examined the performances of both of the groups on the writing posttest to examine the differences between their writing ability. Table 11 shows the results of this comparison:

Table 11

Posttest Performances of CCP and CSS Groups

Groups	N	M	SD	SEM
CCP	14	68.14	4.185	1.119
CSS	14	63.57	4.033	1.078

The researchers used an independent-samples t-test to examine the significance of the difference between the posttest performances. Table 12 shows the relevant results.

Table 12

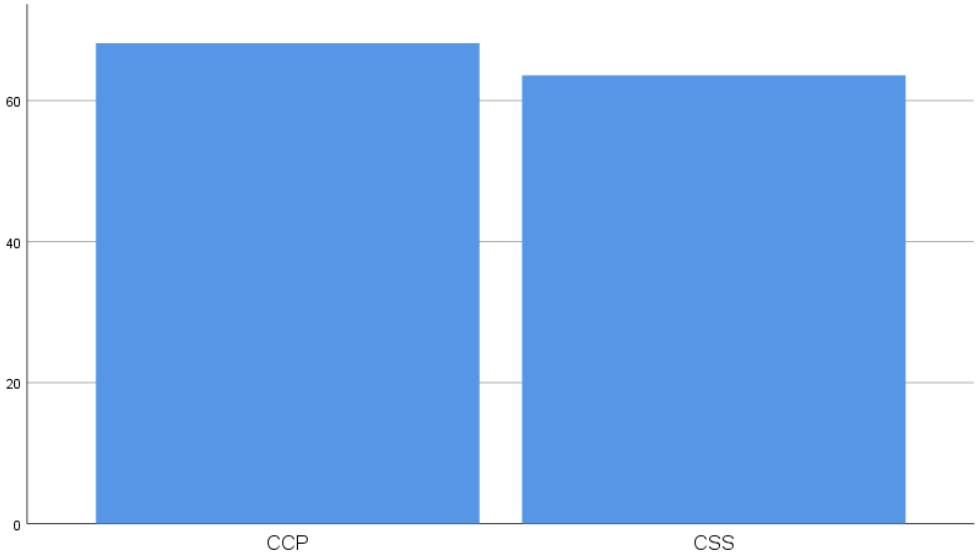
The t-test of Posttest Performances of CCP and CSS Groups

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.015	.902	2.943	26	.007	4.571	1.553	1.378	7.764
Equal variances not assumed			2.943	25.964	.007	4.571	1.553	1.378	7.765

As shown in Table 10, there was a significant difference between posttest performances of CCP and CSS (t (26) = 2.943, p=.007, η2=.126). That is, CCP outperformed CSS on the writing posttest. Figure 4 shows these results:

Figure 4

Posttest Performances of CCP and CSS Groups



Discussion

The first research question investigated the impact of the interaction of contextualizing as the educational implication strategy and collaborative programming on the development of the writing ability of Iranian EFL learners. The results highlighted the fact that the interaction of contextualizing and collaborative programming significantly improved the participants' writing ability in their academic setting. In general, these results underpin the results of the studies that were carried out by Zeng and Takatsuka (2009), Perin (2011), Abahussain (2020), Betlen (2021), and Pinoliad (2021). These studies stated that contextualizing and collaborative programming had positive effects on language learners' skill development in foreign and second language classrooms.

Prayekti (2016) noted that contextualizing constitutes an effective educational strategy that can ameliorate language learners' development of productive language skills including writing. As he noted, this strategy takes advantage of diverse material categories including the audiovisual materials, and empowers the learners to relate the knowledge of their tasks to their background information. As he noted, the learners' ability to integrate the task knowledge with their previous knowledge expedites their task performance. Moreover, Zeng and Takatsuka (2009) argued that collaborative programming can improve the language learners' skill development due to its effect on the learners' use of mediated learning. They noted that the language learners are able to use their collaboratively-developed plans for mediating higher forms of their mental ability including the organization of thought patterns in writing tasks. They concluded that this kind of mediation enables the learners to perform their tasks in an appropriate way.

Given this discussion, it can be averred that, in the present study, the interaction of contextualizing and collaborative programming significantly improved the participants' writing ability in their IELTS tasks since it empowered them to relate the knowledge of tasks to their background information and expedited their ability to organize their thought patterns and to express them effectively in these tasks.

The second research question examined the degree to which the interaction of contextualizing as the educational implication strategy and self-scaffolding had a significant effect on the development of the writing ability of Iranian EFL learners. Based on the results, the interaction of contextualizing and self-scaffolding significantly ameliorated the language learners' writing performance. Generally, these results support the results of the studies that were conducted by Baleghizadeh et al. (2011), Bigdeli and Rahimi (2015), Mohammed Qadir and Yousofi (2021), Natano (2023), and Pedroso et al. (2023). These studies reported that contextualizing and self-scaffolding had significant positive effects on learners' acquisition of the different language skills and aspects.

Pedroso et al. (2023) stated that contextualizing may have beneficial impacts on language learners' skill development owing to its supportive nature. As they explained, this strategy reduces the learners' cognitive load by making them cognizant of the fact that they can utilize their schemata in order to capitalize on their previous task experiences for performing their new tasks in an effective way. Moreover, Di Nitto (2000) stated that self-scaffolding can improve the language learners' language skill development since it expedites their self-regulation. As he explained, language learners tend to take advantage of diverse types of materials in this strategy, as the artifacts that enable them to exert conscious control over their thought

processes and expedite their self-regulated development of the second language skills.

Considering these discussions, it can be stated that, in the present study, the interaction of contextualizing and self-scaffolding had a significant effect on the development of the writing ability of Iranian EFL learners due to the fact that it helped them to use their task-related schemata and expedited their self-regulated writing skill development.

Finally, the third research question aimed to determine the significant differences between the interaction effects of contextualizing and collaborative programming, and contextualizing and self-scaffolding on the development of the writing ability of Iranian EFL learners. The results of the study showed that there were significant differences between the performances of the groups. More specifically, CCP significantly outperformed CSS regarding the amelioration of the participants' writing ability. In general, these results corroborate the results of the studies that were carried out by Kim (2021) and Avci and Adiguzel (2023). These studies reported that, in general, collaborative programming had a more advantageous impact on learners' language acquisition than the self-scaffolding strategy.

Zeng and Takatsuka (2009) noted that collaborative programming can be more efficacious than self-scaffolding due mainly to the fact that it takes advantage of peer-feedback as the main artefact for promoting learners' self-regulation instead of individual decision-making. As they noted, peer feedback may have a more positive effect on skill development than learners' own perceptions of language learning.

In light of these discussions, it can be argued that in the present study, collaborative programming was more efficacious than self-scaffolding due to the fact that it used peer-feedback as the main artefact for improving the learners' self-regulated IELTS writing task performance in their relevant academic setting.

Conclusion

This study made an effort to determine the extent to which incorporating collaborative programming and self-scaffolding into contextualizing educational implication strategy influenced EFL learners' writing ability. Based on the results, the incorporation of both of these techniques into contextualizing significantly ameliorated the participants' writing performance. Notwithstanding, collaborative programming was more congruent with contextualizing and proved to be more efficacious than self-scaffolding.

The results indicate that EFL teacher educators need to make pre-service and in-service EFL teachers cognizant of contextualizing, along with collaborative programming and self-scaffolding, to enable them to facilitate the learners' self-regulated language learning. Moreover, the results show that the inclusion of the language tasks that are developed based on the use of contextualizing-based collaborative programming and self-scaffolding should be the syllabus designers' priority in materials development. The relevant tasks are likely to reduce learners' anxiety and to increase their motivation for learning the target language (Prayekti, 2016). Lastly, teachers can take advantage of contextualizing-collaborative-programming and contextualizing-self-scaffolding in lower and higher proficiency levels, respectively. The use of contextualizing-self-scaffolding in advanced levels may have a more advantageous impact on learners' writing ability, owing to these learners' higher autonomy levels compared to the learners at lower proficiency levels.

The present study suffered from certain limitations since it was not able to use random assignment and could not control the impact of learner characteristics, such as age, on the results.

Moreover, the researchers delimited the study by focusing on language institute settings and by selecting male learners as the participants. The future studies have to deal with these limitations and delimitations. In addition, they should use mixed-methods designs to delve more deeply into the role of educational implication strategies and collaborative-programming and self-scaffolding in learners' development of language skills. Finally, future studies should be carried out in both foreign and second language contexts to determine the generalizability of the results of the present study.

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