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The Effects of Peer and Teacher Technology-Enhanced Scaffolding through Process Approach on Iranian EFL Learners' Collocational Knowledge: The Case of Impulsive and Reflective Learners

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ABSTRACT

This study examined the effects of peer and teacher technology-enhanced scaffolding through process approach on Iranian EFL learners' collocational knowledge with regard to impulsivity and reflectivity. The participants included 132 EFL learners at the intermediate level selected from an initial number of 204 learners based on their scores on Preliminary English Test (PET). The 132 learners were divided into three groups and given a collocation pretest and the reflectivity/impulsivity questionnaire. The three groups of the study were the peer scaffolding (N=48), the teacher scaffolding (N=43), and the control group (N=41). In each of the three groups, there were both reflective and impulsive learners. The first experimental group received peer scaffolding via Telegram while the second experimental group was exposed to teacher scaffolding. As for the control group, no teacher or peer scaffolding was provided and the learners were taught collocations in a conventional way. After the treatment, the posttest of collocations was given to the three groups. The results revealed that both peer and teacher scaffolding significantly affected collocation learning. However, there was no significant difference between peer and teacher scaffolding in terms of their effects on collocation learning. The results also indicated that the main effect of treatment on collocation learning was significant; however, there was not a statistically significant interaction between peer and teacher scaffolding through the process approach in a technology-enhanced environment and reflectivity vs. impulsivity on EFL learners' collocation learning. Based on the results, EFL teachers can employ both peer and teacher scaffolding in a technology-enhanced environment to improve EFL learners' collocational knowledge irrespective of learners' impulsivity and reflectivity.

Keywords: collocations, peer scaffolding, reflectivity/impulsivity, teacher scaffolding, technology-enhanced learning.

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1. Introduction

As pre-made word combinations, collocations have proved to be vitally essential for teachers and learners; therefore, they need to be incorporated in L2 classes (Akbari & Chalak, 2019; Hasani & Dastgoshadeh, 2021; Thornbury, 2002). As pointed out by Sinclair (2004), collocations involve the co-existence of two items in a text in a specified context. Collocations have to do with making use of a variety of terms (e.g., lexical chunks, lexical bundles, among others), which enable the production of native-like speech and writing (Crowther et al., 2002). According to Hill (2000), although collocations play an important role in L2 classes, the majority of students do not possess adequate competence in using them. Several studies (Dastmard et al., 2016; Sadeghi & Panahifar, 2013; Shamsudin et al., 2013) in the Iranian context of English language teaching (ELT) have pointed out that Iranian EFL learners commit different types of errors in regard to colocations. In the same vein, other researches (Basal, 2019; Chen, 2011; Jamali Kivi et al., 2021; Lateh et al., 2021; Nesselhauf, 2003; Pakdaman & Pourhosein Gilakjani, 2019; Teng, 2019; Vahdat et al., 2020; Wongkhan & Thienthong, 2020) have observed similar issues regarding collocations; thus, they deem collocation teaching as an important aspect of vocabulary teaching. Having knowledge of collocation, L2 learners are able to produce natural-sounding speech and writing in the L2. Furthermore, there is general consensus that collocational knowledge contributes to fluency (Laufer, 2011; Wu et al., 2010).

Given that collocational knowledge is of great importance, there still needs to be more research on how learners can acquire collocational proficiency in the best way (Zaabalawi & Gould, 2017). This is because very limited investigations have sought to identify the best ways to instruct collocations (Gatbonton & Segalowitz, 2005). Decidedly, collocations need to be taught differently from the methods used to teach other vocabulary items, as they create many challenges for L2 learners given their unpredictable nature (Basal, 2019). The emergence of advanced technology has paved the way for innovative teaching practices in the realm of ELT in general as well as vocabulary and collocations through the application of technology in different ways (Barjesteh & Isaee, 2024; Ebadi et al., 2024; Teng, 2019). Basal (2019), highlighting the important role of technology in learning collocations, notes that the incorporation of technology in collocation learning and teaching assists learners in overcoming problems with learning collocations. Nowadays, the surge of social media has given rise to the use of such media for language teaching and learning purposes (Alahmad, 2020). This shift towards technology-enhanced learning (TEL) is increasingly recognized as essential for developing the transformative competences needed to navigate modern challenges (Noroozi, 2025). Noroozi (2025) argues for a move beyond traditional classrooms towards TEL environments that provide second-order scaffolding – tools for learning how to learn – which are crucial for fostering deeper, more autonomous learning. Such affordances, available in TEL environments, can thus be capitalized on to go beyond simple knowledge transmission and empower learners in their collocational development.

In the view of Kaplan and Haenlein (2010), social Media has to do with a series of Internet-based applications that make use of the ideological and technological capabilities of Web 2.0, which enables the production and exchange of User Generated Content. Mobile technologies provide a novel paradigm in the context of connectivity, communication, and cooperation in our daily lives (McQuiggan et al., 2015). Although these new manifestations of communication are appealing to L2 teachers, learners, and L2 learning materials producers, their application in L2 learning and teaching has raised many hot debates, as there is very little, if any, evidence on whether and how they can enhance L2 learning (Lamy & Zourou, 2013). One such social media application which has attracted a great deal of attention quite recently is Telegram. As Mashhadi Heidar and Kaviani (2016) contend, due to its accessibility and user-friendliness, this social network application is used more than other social medias available among Iranian social network users. The results of previous investigations have shown the effectiveness of Telegram in terms of vocabulary learning (Ghobadi & Taki, 2018), learning collocations (Ahmadpour Kasgari & Mirarab Razi, 2020; Vahdat et al., 2020), reading (Shirinbakhsh & Saeidi, 2018), and writing (Sarvari & Ezzati, 2019). However, none of these studies have explored the effect of Telegram on collocations via offering scaffolding.

The notion of scaffolding emanates from Lev Vygotsky's Zone of Proximal Development (ZPD), which is concerned with the level of learning that people can attain with help or guidance (Vygotsky, 1978). In accordance with this theory, to help learners pass the ZPD, it is necessary to draw on a more knowledgeable expert or a teacher, social interactions, scaffolding, as well as other supportive activities (Cai et al., 2025). As mentioned by Wood et al. (1976), as a social process, scaffolding is in keeping with helping learners to achieve their future independence, as scaffolding is used

temporarily to enhance interaction. Donato (1994), as cited in Cotterall and Cohen (2003), maintains that scaffolding is deemed as a social interaction between the expert and the novice. Walqui (2006) characterized scaffolding as a type of interactive tool which is contingent, collaborative and interactive. Through engaging in the interaction, the expert offers support to the novice. Moreover, scaffolds may refer to "models, cues, prompts, hints, incomplete solutions, think-aloud modeling and direct training (Yau, 2007). As an instructions tool, scaffolding helps students to learn how to solve a problem, deal with a task, and obtain their goals (Pinantoan, 2013). Scaffolding makes important contributions to L2 teaching, playing an important role in different aspects of L2 learning.

The results of previous studies are a confirmation seal on the positive effect of scaffolding on EFL learners' speaking skill (Razaghi et al., 2019), reading comprehension (Attarzadeh, 2011; Ghafar Samar & Dehqan, 2013; Poorahmadi, 2009), essay writing (Ndoricimpa, 2019), and vocabulary learning (Shoari & Assadi Aidinlou, 2015). Moreover, recent studies have also corroborated the effectiveness of scaffolding. For instance, Mirsanjari's (2025) results demonstrated the significant impact of dialogic scaffolding deployed within digital environments like Google Classroom and Zoom on EFL learners' writing proficiency, structural coherence, and grammatical accuracy. In a similar vein, Yang et al.'s (2022) results revealed the positive effects of nested scaffolding designs incorporated in fully online courses on enhancing students' learning outcomes. Moreover, they founded that such interventions rendered the learning cycles more manageable for the students. Additionally, as shown by Xu et al. (2023), the integration of teacher scaffolding within a mobile-supported collaborative learning environment positively influenced learning outcomes and students' engagement in reading classes. Yuan (2022) also highlights the success of a technology-enhanced, nested learning model in fostering communicative competence and self-confidence among EFL learners, illustrating how well-designed digital ecologies can support language development.

One of the main aspects of scaffolding is that it is process-oriented and assistance by the expert and development transpire in a process-oriented way. This process-orientedness is highly important when it comes to learning lexical items such as collocations and words. According to Nation (2001), recalling a word requires three main processes including noticing, retrieval, and creative or generative use. In the noticing phase, the individuals need to be consciously aware of the word to be learned. They must pay explicit attention to the unknown items. As for the retrieval stage, the learner is able to recall the word, as well as its meaning. Eventually, in the generative phase, the learner should use a variety of generative strategies, including mnemonic strategies and visualizations (Nation, 2001). Besides these tools, irrespective of the techniques used by teacher, the current level of learners' vocabulary knowledge and their affective states, such as motivation, anxiety, styles and so on should be taken into consideration and accordingly correct feedback should be provided.

A review of the previous empirical literature indicates that so far some investigations have explored word knowledge from a process-oriented perspective. Quite relevant to the objectives of the current study, Mansouri and Mashhadi Heidar (2019) explored the impacts of peer/teacher technology-enhanced scaffolding through process approach and Iranian EFL learners' vocabulary knowledge while considering the role of self-regulation. The results demonstrated that both peer and teacher scaffolding significantly affected vocabulary learning and was no significant difference between peer and teacher scaffolding in terms of their effects on vocabulary learning. Moreover, it was found that there was no statistically significant difference between the effects of the two treatment modalities on high and low self-regulated learners' vocabulary learning. In another study, Mansouri and Mashhadi Heidar (2020) probed into the sociological effects of peer/ teacher technology-enhanced scaffolding through process approach on young male vs female EFL learners' vocabulary knowledge. The results indicated that both teacher and peer scaffolding significantly affected learners' vocabulary improvement irrespective of gender.

Jamali Kivi et al. (2021) compared the effects of teacher versus peer-scaffolding on EFL learners' incidental vocabulary learning and reading comprehension. The results indicated that both teacher and peer-scaffolding significantly contributed to learners; reading comprehension and vocabulary learning. Moreover, there was a significant difference between teacher-scaffolding and peer-scaffolding in both vocabulary knowledge and reading comprehension performance with the peer-scaffolding outperforming the teacher-scaffolding group. Despite the bulk of previous studies related to different types of scaffolding and different language skills and components, few if any of the previous investigations have considered the role of cognitive styles in general and the reflectivity/impulsivity cognitive styles in particular with regard to scaffolding.

A significant problem in EFL instruction lies in transcending the mere recognition of collocations as an important component of language proficiency towards identifying instructional approaches that can effectively teach them. This difficulty is clearly visible in the Iranian context, where research (Dastmard et al., 2016; Sadeghi & Panahifar, 2013) has consistently shown that EFL learners struggle with collocational learning. However, the problem is not solely national; the international field continues to grapple with optimizing technology-based instruction for specific linguistic features. While pedagogical approaches like scaffolding within digital platforms show great potential, as seen in Mirsanjari's (2025) work on writing, there is not adequate evidence about its direct impact on collocation acquisition. Moreover, the role of individual learner variables such as cognitive styles in regard to language learning in general and collocation learning in particular even require more attention. Recent international studies, such as that by Faruji et al. (2024), showed that a learner's cognitive style—whether they are impulsive or reflective—can significantly impact outcomes in computer-assisted language learning. However, the critical associations among these three areas—technology-enhanced scaffolding, collocation learning, and cognitive styles—remains quite under-studied. It is precisely this gap that the present study seeks to address, by investigating how peer and teacher scaffolding via Telegram affects collocation learning among Iranian EFL learners with different cognitive dispositions.

As Chen (2021) notes, cognitive style is described as a type of learning style and learning tendency, characterized by distinct personality displayed by learners in long-term learning activities. In the view of Faruji et al. (2024), cognitive style has to do with how learners spot, process, store, derive information in the cognitive process. Such a style is considered as the starting point in solving problems, and sometimes change into learning styles. There is a close association between cognitive style and second language acquisition. There are many sub-types of cognitive styles with their own characteristics. Two of the cognitive styles are reflective and impulsive. Reflective-impulsive cognitive style was introduced by Kagan et al. (1964), which involves differences with respect to the speed with which individuals make decisions under uncertain circumstances. This type of cognitive style can be generally subdivided into two different types: 1- making a quick decision following a short examination of different possibilities, and the general error rate is relatively high, known as impulsive type. 2- The other type involves thinking in detail prior to any action, which takes a certain amount of time to exactly take into account all the possibilities. Here, the accuracy is relatively high, which is known as the reflective type (Shilan, 2010). Brown (2007) asserts that psychological investigations have been carried out to make either a quick or gambling (impulsive) guess at an answer to a problem or a more calculated (reflective) decision which takes more time.

The results of previous investigations have revealed contradictory results with regard to language learning and individuals with reflective and impulsive orientations. Chen (2021) found that there was a relationship between reflective-impulsive cognitive style and the oral ability of English learners. Moreover, their results revealed that students with different cognitive styles have differences in oral performance with reflective learners outperforming the impulsive learners with regard to oral accuracy while English learners with impulsive cognitive style outperformed better in oral fluency than students with reflective style. On the contrary, Morovat (2014) found that there was no relationship between the reflectivity and impulsivity and IELTS candidates' band scores. The interplay between cognitive style and language learning continues to be a rich area of investigation, with recent studies offering more specific insights. Research indicates that reflective and impulsive learners may respond differently to instructional methods and technological tools. For example, reflective EFL learners have been shown to significantly outperform their impulsive counterparts in speaking tasks within both computer (Prezi) and mobile (WhatsApp) mediated shadowing environments (Faruji et al., 2024).

In writing, reflective learners also demonstrated superior performance and a greater appreciation for learning-oriented assessment (LOA) tasks that demanded critical thinking (Estaji & Safari, 2023). Moreover, a significant positive correlation exists between reflective learners' use of oral communication strategies and their willingness to communicate, a relationship not found to be significant among impulsive learners (Salehi & Nosratinia, 2022). However, it is noteworthy that some interventions, such as online Group Dynamic Assessment (GDA), have been found to improve writing accuracy equally for both reflective and impulsive ESP students, suggesting that certain structured, interactive feedback methods can effectively bridge the gap posed by cognitive style differences (Mohammadi Sarab et al., 2024).

As the results of previous investigations (Ahmadpour Kasgari & Mirarab Razi, 2020; Ghobadi & Taki, 2018; Sarvari & Ezzati, 2019; Shirinbakhsh & Saeidi, 2018; Vahdat et al., 2020) indicate, there has been a surge of studies confirming

the effectiveness of the use of Telegram on different aspects of language learning. Moreover, a review of previous studies (Attarzadeh, 2011; Faruji et al., 2024; Ghafar Samar & Dehqan, 2013; Poorahmadi, 2009; Mirsanjari, 2025; Razaghi et al., 2019) also show the effectiveness of scaffolding on different aspects of EFL learners' language skills. Likewise, previous studies (Jamali Kivi et al. 2021; Mansouri & Mashhadi Heidar, 2019; Mansouri & Mashhadi Heidar, 2020) have corroborated the positive effects of both peer and teacher scaffolding on different language skills and components. Furthermore, the results of previous investigations (Chen, 2021; Morovat, 2014) with regard to reflectivity/impulsivity and language learning are contradictory. Although there is a bulk of studies on the Telegram, scaffolding, and reflectivity/impulsivity, few if any has so far examined the effects of peer/teacher technology-enhanced scaffolding through process approach on Iranian EFL learners' collocational knowledge with the mediating role of impulsivity and reflectivity. To address the existing gap in the empirical literature, the following research questions are formulated:

RQ1: To what extent does technology-enhanced peer scaffolding, operationalized through a process approach, impact the development of collocational knowledge among Iranian EFL learners?

RQ2: To what extent does technology-enhanced teacher scaffolding, operationalized through a process approach, impact the development of collocational knowledge among Iranian EFL learners?

RQ3: Is there a statistically significant difference in the efficacy of technology-enhanced peer scaffolding versus teacher scaffolding, both delivered through a process approach, on Iranian EFL learners' acquisition of collocational knowledge?

RQ4: Does the interaction between scaffolding type (peer vs. teacher) and cognitive style (impulsive vs. reflective) yield a statistically significant effect on the acquisition of collocational knowledge in a technology-enhanced learning environment?

2. Methodology

Design

This study adopted a quasi-experimental pretest, posttest, comparison design. The study was quasi-experimental as it was not manageable and practical to select and assign the participants in a pure randomized manner. Moreover, since both pretest and posttest scores were used to address the research questions, and two scaffolding modalities (i.e., peer and teacher technology-enhanced scaffolding) as well as two types of cognitive styles (i.e., impulsivity and reflectivity) were compared, the design of the study is also a pretest, posttest, comparison type.

2.1 Design

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2.2 Participants

The initial participants of the study included 204 Iranian EFL learners at the intermediate level of language proficiency. They were from both male (N=98) and female (N=106) learners and were selected based on convenience sampling procedures due to the lack of feasibility for selecting the participants in a pure random manner. The participants were within the age range of 25 to 42 and they were all Persian speakers. These learners were given a proficiency test and based on the scores only those whose scores were within the range of +/- one standard deviation from the men were chosen. To this end, 132 learners were selected.

2.3 Instruments

2.3.1 Preliminary English Test (PET)

A homogeneous group in terms of language proficiency was selected using PET. This test is tailored to the language learners enrolled at intermediate level and consists of 4 sections to measure all 4 language skills (speaking, writing,

reading, and listening). The administration lasts for 2 hours. The reading part consists of 35 questions given as multiple choice, matching and true-false items. The students should complete some incomplete sentences on the first part of the writing section. As far as the writing tasks are concerned, in the first writing section, the participants are given information in form of postcard, note, or email. They must compose a paragraph made up of about 35 words. Furthermore, two other topics are given; and they are able to select either of them and write 100 words about it. Scoring is based on the writing rating scale of PET. The rating scale draws on Cambridge General Mark Schemes for Writing, with the final score ranging from 0-5, which was then changed into a score of 15 for each subject. The criteria for evaluating the writing are as follows: relevance, understandability, accuracy, coherence and organization, and the range of vocabulary used. The listening section is made up of 4 sections with a total of 25 multiple choice questions, which lasts 30 minutes. Learners need to listen to several short recordings and choose the best option for each item. The reading part and writing part have 50% of the total mark, while the listening section carries 25% of the total mark. The total mark for the whole test is 100.

2.3.2 Reflectivity/Impulsivity Questionnaire

The questionnaire used to assess Reflectivity/Impulsivity in this investigation was devised by Patton et al. (1995), which is made up of 30 items with a Likert scale of never, occasionally, often always ranging from 1 to 4. The total score obtained was 120 and the higher the score, the more impulsive the participant was. The Persian version of the questionnaire was piloted by Ekhtiari et al. (2008), which turned out to have a Cronbach's Alpha index of 0.831 in the Iranian context.

2.3.3 Collocations Test

A collocation test was designed by the researcher. The test was used for pre-test and post-test purposes. To this end, 40 collocations were selected form 10 units of "*English Collocations in Use*" written by O'Dell and McCarthy (2011) and a 40-item multiple choice collocation test was developed. The reliability of the test was established through piloting it on 30 participants with the same characteristics of the main participants of the study and Cronbach's Alpha was run on the obtained scores. The reliability index was found to be 0.77 which is an acceptable index.

2.4 Materials

"English Collocations in Use" authored by O'Dell and McCarthy (2011) and published by Cambridge contains a large number of collocations in typical contexts. Students at intermediate level can use this book, which this study used to choose the collocations.

2.5 Procedure

At first, 204 students were selected based on convenience sampling. Then, they sat for a sample copy of PET. Given the results, 132 subjects whose scores ranged from +/-one standard deviation in terms of the mean were selected. Finally, three groups consisting of the peer scaffolding (N=48), the teacher scaffolding (N=43), and the control group (N=41) were formed. This was followed by the administration of a collocation pretest and reflectivity/impulsivity questionnaire for the three groups. Participants' scores in reflectivity/impulsivity questionnaire were also obtained, with students with scores above the mean deemed as impulsive learners and those with scores below the mean as reflective learners. Thus, three groups were formed (peer and teacher scaffolding groups and the control group) in which there were both reflective and impulsive students.

Then, treatment was administered using Telegram based on the tenets of process approach as emphasized by Nation (2001) including noticing, retrieval and generation. The treatment in both peer and teacher scaffolding groups drew on Nation's three phases. The two groups were different only with respect to the scaffolding, in that in peer scaffolding group, scaffolding was done by peers and in the case of teacher scaffolding group, it was done by the teacher. In the view of Nation (2001), in the noticing stage, as the initial stage of the process, the learner needs to be consciously made aware of the collocation to be learned. In this study, this awareness was given to the learners through highlighting the target collocation in the sentences containing the collocations posted on Telegram. According to Nation (2001), retrieval stage is the second stage where the learner is highly likely to recall the collocation along with its meaning. In this study, the retrieval stage was operationalized via the sentences with the target collocations missing posted on Telegram. The scaffolder could access the Internet and find sample sentences having the target collocations. The learner-scaffolders were trained to delete the target collocations and post the sentences via Telegram app. The

scaffolder could also find photos which represented the target collocations or showed the target collocations and post them on Telegram to facilitate the retrieval. The third stage was the generative stage where the participant needs to use various generative strategies, including mnemonic strategies and visualizations to consolidate the target collocations and employ them productively. In this investigation, the generative stage was materialized by training the learners to give their partner a target collocation item and requesting the partner to either send over a sentence in which the collocation has been used, or a photo which displays the collocation under instruction via Telegram.

The students in the peer scaffolding class were trained how to carry out peer scaffolding on Telegram. To this end, the teacher instructed them on how to provide scaffolding on three sample target collocations for the whole class via Telegram and one of the learners as a peer. The teacher asserted that this procedure was presented only as an example and the learners did not have to repeat it strictly. They were told that the important goal was to help their peers to learn the collocation items. This was followed by creating a group on Telegram by teacher and adding all the learners to the group; yet, only the selected learner could engage in interaction with the teacher. Then, the teacher first spotted one sample sentence for each one of the three target collocations and highlighted the collocations in question. Next, the teacher copied and pasted the sample sentences onto the group. The learners had a minute to read the sentences. Then, the teacher wanted the participant to figure out the meaning of the boldfaced items by guessing. In the case of incorrectness of the guess, the teacher could provide the learner with synonyms or a definition.

Furthermore, the teacher gave the learner more example sentences till the learner could find the correct meaning of the collocation. With regards to the second stage, the teacher copied and pasted three other sample sentences with the target collocations missing, pushing the selected participant to complete the blanks with one of the collocations under instruction. Then, the teacher used a couple of photos representing the collocations, asking the learner to say the collocation which was closely related to the photo. Eventually, the teacher asked the participant to make a sentence with each collocation. The teacher also asked the learner to see if s/he can find other pictures on the net regardless of the pictures she had already found which represented the collocations. Then learners in paired groups were exposed to half of the target collocations (7 collocations) for each session. While at home, each pair had to work on the target collocation items and assist the peer with learning the intended collocation items. The following screenshots show the initial stage of the treatment as carried out by a pair. Each student pair had to let the teacher as the third member join the pair chat groups. The aim was to ensure that the learners could manage to practice all the collocations. The teacher constantly monitored to make sure that learners were engaged in practicing the collocations. However, no feedback was given by the teacher.

Regarding teacher scaffolding group, the same procedure was followed with small changes. In this group, the teacher delivered all the collocation items and the respective scaffolding. To do so, the teacher formed a group in Telegram, and all learners joined the group in order to receive collocation instructions. Like peer scaffolding, the teacher followed three stages of noticing, retrieval and generation, with difference that all the learners were able to join the process simultaneously, while they sent the sentences for the generation stage to the teacher's private page. The teacher gave general comments on erroneous sentences, following up with more sample sentences and also definitions of the collocations for the learners who needed more assistance.

With regards to the control group, the traditional teaching of collocation items was performed within the classroom environment. In this group, the same list of collocation items was used by the teacher and instances were also offered. More specifically, in this group, the learners were given example sentences and also exercises in *English Collocation in Use* book. Students' questions concerning the meaning of the collocations. The learners were requested to create sentences with the new collocations but all this took place without the Telegram app. Furthermore, no steps were followed for peer or teacher scaffolding via a process approach in the control group. The treatment took five weeks in 10 sessions lasting an hour and half each. Following the completion of the treatment, the groups were given a parallel version of the collocation pretest made up of a different ordering of items as posttest, with the results used to assess the research questions.

2.6 Data Analysis

In this study, both descriptive and inferential statistics were used. Descriptive statistics and skewness and kurtosis indices were used to summarize the data and inspect the normality assumption, respectively. To address the research

questions, One-Way ANOVA and Two-way ANOVA were performed using SPSS version 26 and the associated results were reported.

3. Results

3.1 Addressing the First Three Research Questions

To address the first three research questions, it was initially required to make sure that the three main groups of the study were not significantly different in terms of collocation knowledge and reflectivity /impulsivity to control for these two variables to make sure that the three groups were not significantly different in terms of collocation knowledge. Prior to running the appropriate statistical test, the normality assumption was inspected. Table 1 demonstrates descriptive statistics and skewness/kurtosis indices for the three groups on collocation pretest.

Table 1. Descriptive statistics for the performance scores of individuals in the three groups on collocation pretest

					95% Confidence Interval for Mean				Skewness		Kurtosis	
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum	Statistic	Std. Error	Statistic	Std. Error
Teacher Scaffolding	43	16.5116	2.62200	.39985	15.7047	17.3186	12.00	22.00	-.014	.374	-.392	.733
Peer Scaffolding	48	17.0208	2.08836	.30143	16.4144	17.6272	14.00	21.00	.012	.374	-.110	.733
Control Group	41	16.7805	2.09180	.32668	16.1202	17.4407	14.00	23.00	.122	.374	-.319	.733

As noticed in the above table, the skewness and kurtosis statistics for all three data sets fell within the range of ±1.96, and thus, the normality assumption was met (Corder & Foreman, 2014). A one-way ANOVA was therefore conducted on the collocation pretest scores. Table 2 shows the results of the one-way ANOVA test on the collocation pretest scores.

Table 2. Results of One-way ANOVA test for comparing the peer scaffolding group, teacher scaffolding group and control group in terms of collocation knowledge on pretest

ANOVA					
Pretest Collocations					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.881	2	2.941	.567	.569
Within Groups	668.748	129	5.184		
Total	674.629	131			

As noticed in Table 2, there is no significant difference among the three groups in terms of collocation knowledge at the outset of the study ($F = 0.567$, $p = 0.56 > 0.05$). Table 3 displays the results of the one-way ANOVA test on the reflectivity/impulsivity questionnaire scores.

Table 3. Results of One-way ANOVA test for comparing the peer scaffolding group, teacher scaffolding group and control group in terms of reflectivity/impulsivity scores

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	472.301	2	285.024	.73	.421
Within Groups	4934.721	129	26.440		
Total	5407.022	131			

As presented in Table 3, there is no significant difference among the three groups in terms of reflectivity/impulsivity scores ($F = 0.73$, $p = 0.42 > 0.05$). Accordingly, it was established that there were no significant differences among the three groups of the study in terms of collocation knowledge and reflectivity/impulsivity. Therefore, any differences among the three groups on posttest could be associated with the effects of peer and teacher scaffolding via a technologically-enhanced environment. Table 4 shows the descriptive statistics for the performance scores of individuals in the three groups on collocation posttest.

Table 4. Descriptive statistics for the performance scores of individuals in the three groups on collocation posttest

					95% Confidence Interval for Mean			
	N	Mean	Std. Deviation	Std. Error	Lower Bound	Upper Bound	Minimum	Maximum
Teacher Scaffolding	43	24.0930	3.58445	.54662	22.9899	25.1962	19.00	34.00
Peer Scaffolding	48	23.8125	3.45584	.49881	22.8090	24.8160	20.00	34.00
Control Group	41	18.1951	2.54184	.39697	17.3928	18.9974	15.00	25.00
Total	132	22.1591	4.18618	.36436	21.4383	22.8799	15.00	34.00

Based on descriptive statistics, peer scaffolding group scored 104.60 (SD=8.11), teacher scaffolding group scored 104.10 (SD=7.93), and the control group scored 97.75 (SD=7.84) on collocation posttest. Table 5 shows the results of one-way ANOVA among the three groups in terms of collocation posttest scores.

Table 5. Results of One-way ANOVA between the groups in terms of collocation posttest scores

ANOVA					
Posttest Collocations					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	936.280	2	468.140	44.425	.000
Within Groups	1359.379	129	10.538		
Total	2295.659	131			

According to the output of one-way ANOVA test, a significant difference existed among the groups ($F = 44.42$, $p = 0.00$). This means that at least two of the groups were significantly different in terms of posttest collocation scores. To discover the existing differences, the Post Hoc test of Tukey was conducted. Table 6 shows the results of Post Hoc test of Tukey.

Table 6. Results of post hoc test of Tukey

Dependent Variable: Posttest Collocations						
Tukey HSD						
(I) Groups Pretest	(J) Groups Pretest	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Teacher Scaffolding	Peer Scaffolding	.28052	.68162	.911	-1.3356	1.8967
	Control Group	5.89790*	.70858	.000	4.2178	7.5780
Peer Scaffolding	Teacher Scaffolding	-.28052	.68162	.911	-1.8967	1.3356
	Control Group	5.61738*	.69033	.000	3.9806	7.2542
Control Group	Teacher Scaffolding	-5.89790*	.70858	.000	-7.5780	-4.2178
	Peer Scaffolding	-5.61738*	.69033	.000	-7.2542	-3.9806
*. The mean difference is significant at the 0.05 level.						

The Post Hoc test of Tukey indicated that the control group was significantly different with both the peer scaffolding group and teacher scaffolding group ($p<0.05$). Therefore, it can be concluded that peer scaffolding through the process approach in a technology-enhanced environment significantly affects collocation learning. Likewise, teacher scaffolding through the process approach in a technology-enhanced environment significantly affects collocation learning. However, there was no significant difference between teacher scaffolding and peer scaffolding groups ($p>0.05$). Therefore, it can be inferred that both teacher and peer scaffolding via a technology-enhanced environment positivity impacted collocation learning regardless of impulsivity/reflectivity. Moreover, there was not any significant difference between peer and teacher scaffolding in a technology-enhanced environment on collocation learning.

3.2 Addressing the Fourth Research Question

The fourth research question of the current study sought to discover any significant interaction between reflectivity/impulsivity and peer and teacher scaffolding through process approach in a technology-enhanced environment on collocation learning. The answer to this research question was provided through employing a two-way ANOVA. Table 7 presents the results of Levene's test of homogeneity of variances.

Table 7. Results of Levene's test of equality of error variances

F	df1	df2	Sig.
.521	5	126	.487
Tests the null hypothesis that the error variance of the dependent variable is equal across groups.			
a. Design: Intercept + Reflectivity/impulsivity+ Treatment + Reflectivity/impulsivity* Treatment			

According to the Levene's test of equality of variances, variances were equal across the groups since the significant value equals .910> 0.05, which exceeds 0.05 alpha value. Hence, the use of two-way ANOVA on posttest scores was legitimate. Table 8 shows the interaction of reflectivity/impulsivity and peer/teacher scaffolding.

Table 8. Results of Two-way ANOVA reported for the interaction of reflectivity/impulsivity and peer/teacher scaffolding on learning collocations

Tests of Between-Subjects Effects						
Dependent Variable: Posttest Collocations						
Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	936.973a	5	187.395	17.378	.000	.408
Intercept	62569.426	1	62569.426	5802.479	.000	.979
Groups	896.312	2	448.156	41.560	.000	.397
Reflectivity/Impulsivity	.007	1	.007	.001	.980	.000
Groups * Reflectivity/Impulsivity	.690	2	.345	.032	.969	.001
Error	1358.686	126	10.783			
Total	67111.000	132				
Corrected Total	2295.659	131				
a. R Squared = .408 (Adjusted R Squared = .385)						

Based on the two-way ANOVA output, it was revealed that the main effect of treatment on collocation learning was significant ($F = 41.56$, $p = 0.00 < 0.05$), however, there was no statistically significant difference between the effects of the two treatment modalities on students' collocation learning with regard to impulsivity/reflectivity ($F = .001$, $p = 0.98 > 0.05$). Furthermore, the significant value corresponding to Groups * Reflectivity/Impulsivity equals .96 which signifies that there is not a statistically significant interaction between peer and teacher scaffolding through the process approach in a technology-enhanced environment and reflectivity/impulsivity on EFL learners' collocation learning.

4. Discussion

The present study aimed at investigating the effect of peer and teacher scaffolding through process approach in a technology-enhanced environment on collocation learning among reflective and impulsive learners. The results revealed that both peer and teacher scaffolding significantly affected collocation learning. However, there was no significant difference between peer and teacher scaffolding in terms of their effects on collocation learning. The results also indicated that the main effect of treatment on vocabulary learning was significant; however, there was no statistically significant difference between the effects of the two treatment modalities on students' collocation learning with regard to reflectivity/impulsivity.

The findings of the present study confirm the results of previous investigations concerning the positive role of scaffolding on learning different language skills and components. The findings of the present study are in line with Shoari and Assadi Aidinlou's (2015) findings. They showed that scaffolding positively and significantly contributes to vocabulary learning. Moreover, the results of the present study corroborate the findings of other similar investigations concerning the effectiveness of scaffolding on speaking skill (Razaghi & Bagheri, 2020), and reading comprehension (Attarzadeh, 2011; Ghafar Samar & Dehqan, 2013; Poorahmadi, 2009). In a similar vein, the results of this study are in line with those studies substantiating the positive impact of Telegram on different language skills and components such as Telegram in terms of vocabulary learning (Ghobadi & Taki, 2018), learning collocations (Ahmadpour Kasgari & Mirarab Razi, 2020; Vahdat et al., 2020), reading (Shirinbakhsh & Saeidi, 2018), and writing (Sarvari & Ezzati, 2019).

The findings of the present study also confirm the results of previous investigations concerning the positive effectiveness of teacher and peer scaffolding. For instance, Mansouri and Mashhadi Heidar (2019) demonstrated that both peer and teacher scaffolding significantly affected vocabulary learning and was no significant difference between peer and teacher scaffolding in terms of their effects on vocabulary learning. Similarly, Mansouri and Mashhadi Heidar

(2020) probed into the sociological effects of peer/ teacher technology-enhanced scaffolding through process approach on young male vs female EFL learners' vocabulary knowledge. The results indicated that both teacher and peer scaffolding significantly affected learners' vocabulary improvement irrespective of gender. Similarly, Jamali Kivi et al. (2021) compared the effects of teacher versus peer-scaffolding on EFL learners' incidental vocabulary learning and reading comprehension. The results indicated that both teacher and peer-scaffolding significantly contributed to learners; reading comprehension and vocabulary learning. Moreover, there was a significant difference between teacher-scaffolding and peer-scaffolding in both vocabulary knowledge and reading comprehension performance with the peer-scaffolding outperforming the teacher-scaffolding group.

Concerning the lack of any significant interaction between reflectivity/impulsivity and collocation learning the findings of the present study are supported by the findings of Morovat (2014). Morovat's (2014) findings revealed that there was no relationship between the reflectivity and impulsivity and IELTS candidates' band scores. The findings of the current study are, however; in contradiction with the results of Chen (2021). Chen (2021) found that there was a relationship between reflective-impulsive cognitive style and the oral ability of English learners.

5. Conclusion

Based on the results of the present study it was concluded that scaffolding in general and peer and teacher scaffolding in particular contribute to learning collocations irrespective of reflectivity and impulsivity cognitive styles and the use of a technologically-enhanced environment. The findings promise pedagogical implications for EFL instruction. Based on the findings, teachers are encouraged to integrate technology-enhanced scaffolding, using platforms like Telegram, to enhance EFL learners' collocational knowledge. Importantly, as both peer and teacher scaffolding were found to be positively effective and functioned well irrespective of a student's cognitive style, EFL teachers can adopt flexible and inclusive strategies. This paves the way for the design of more dynamic, collaborative collocation-learning activities that are tailored to diverse classrooms without needing to adjust such approaches specifically to accommodate impulsivity or reflectivity. Thus, EFL teachers can use peer and teacher scaffolding to teach collocations in order to enhance EFL learners' knowledge of collocations.

This study acknowledges certain limitations. The use of convenience sampling and the specific Iranian, adult context limit the generalizability of the findings. Furthermore, the exclusive reliance on Telegram and a single textbook for collocations may not represent the effectiveness of other digital platforms or lexical areas. The study's five-week duration also restricts insights into the long-term retention of the learned collocations. Future investigations may use other platforms and compare the findings with those of the current study. In this study, learners' perceptions of the treatment types were not taken into account. Future investigations may take the learners and/or teachers' perceptions towards the effectiveness of Telegram in contributing to collocation learning. Moreover, expanding the research to incorporate other cognitive or personality factors, such as anxiety or extroversion/introversion, could provide a more comprehensive picture regarding the factors contributing to learning collocations.

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