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Impact of Computer-Based and Textbook-based Instruction on EFL Students' Grammatical Knowledge

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Abstract

Developing students' grammatical knowledge is a vital purpose of EFL teachers. The current study examines the impact of computer-based instruction (CBI) using word order (WO) and gap-fill (GF) exercises compared to text-based instruction (TBI) on EFL students' grammatical knowledge. The quasi-experimental design with a pretest, posttest, and intervention was employed. Participants were elementary students selected through a placement test and randomly assigned to three groups in the Fall semester of 2022. Two experimental groups received CBI (WOG and GFG) while a control group (CG) received TBI. The groups took a pre-test on grammatical structures based on their textbook. The intervention, which included computer-based exercises and relevant websites for word order and gap-fill activities lasted for 16 sessions, followed by a grammar posttest. Data analysis revealed that both experimental groups (WOG, GFG) significantly outperformed the control group (TBI). Although there was no significant difference between the two experimental groups, the WOG group had a higher mean score than the GFG group in the post-test. The findings suggest that using both gap-fill and word order exercises is more effective than text-based instruction for learning grammar. Teachers are encouraged to incorporate gap-fill exercises into their grammar teaching strategies.

Keywords: Computer-based Instruction (CBI); Gap-Filling; Grammar; Text-based Instruction (TBI); Word Order.

1. Introduction

Boosting grammatical competence among English as a Foreign Language (EFL) learners is in teaching the English language, as it significantly affects the acquisition of other language skills such as listening, speaking, reading, and writing (Castillo-Cuesta, 2022). While digital gameplay has been increasingly integrated into pedagogical practices, researchers caution against viewing digital grammar activities as a panacea for all educational challenges.

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Nevertheless, as Sykes (2018) states, "For the past decade, educators have been exploring the inherent complexities and benefits of digital grammar activities and the significant opportunities they provide for effective, meaningful learning" (p. 219). Traditional grammar instruction often faces criticism for being tedious and frustrating, primarily due to its focus on prefabricated patterns and formulaic structures (Clark & Endres, 2021). This perception can potentially hinder learners' future development in EFL or demotivate them from consistently engaging with their courses, particularly at the elementary level.

The advent of digital learning in the 1960s and its rapid expansion during the COVID-19 pandemic has transformed educational landscapes worldwide. As face-to-face classes transitioned to virtual platforms, educational institutions increasingly embraced computer-based and digital learning methodologies. Arkhipova et al., (2018) that blended learning, which combines student-centered methodologies with modern technologies, has emerged as a valuable tool in teaching English as a Foreign (TEFL).

Computer-based instruction (CBI) for grammar learning utilizes online exercises to help learners practice and acquire grammatical patterns. Numerous grammar instruction websites, such as www.baamboozle.com/game and www.educaplay.com, offer free, level-appropriate grammar exercises that provide immediate feedback and explanations, potentially enhancing learners' grammatical competencies without constant teacher intervention (Mardian & Nafissi, 2022). Digital resources can serve as supplementary assignments aligned with the mandatory coursework (Abdulmalik Ali, 2018; Martin et al., 2021). Research has demonstrated that CBI positively impacts student achievement and learning experience by incorporating authentic context (Dwi Laksmita et al., 2020). Moreover, Peterson and Jabbari (2023) emphasize the importance of game-based language learning and advocate for the integration of theoretical approaches and longitudinal studies in this field.

While existing literature suggests that technology-enhanced learning offers advantages over traditional text-based instruction. There is a paucity of research comparing the effectiveness of different types of online grammar exercises, such as gap-fill and word-order tasks (Gorjian et al., 2011). Gap-fill exercises, including cloze tests and simple gap-fill-in-the-blank exercises, require learners to complete incomplete sentences or paragraphs (Pirasteh, 2014). Conversely, word order exercises involve arranging scrambled words to form grammatically correct sentences (Gorjian, 2017). Such activities, which guide students in practicing word order, are simple yet effective, allowing learners to receive computer-generated feedback on their sentence construction (Mardian & Nafissi, 2022). This study addresses this research gap by investigating the comparative effectiveness of online gap-fill and word order exercises in enhancing EFL learners' grammatical competence. By examining these digital learning approaches, the researchers seek to contribute to the growing body of knowledge on technology-enhanced grammar instruction and inform best practices in EFL pedagogy.

Accordingly, the focus of this study is on learning grammatical structures including subject-verb agreement, prepositions of time and place, using adverbs (i.e., manner, time, and place), question, and negative forms among learners in three groups: Word Order Group (WOG), Gap-Filling Group (GFG), and Control Group (CG). It attempts to formulate the following research questions (RQs):

Q1. Does CBI word order or gap-filling exercises affect EFL learners' grammatical competence?

Q2. What is the difference between CBI and TBI exercises in learning grammatical structures among EFL students?

2. Review of Literature

This section reviews the literature on computer-based instruction (CBI) and its effectiveness in teaching English grammar, particularly compared to traditional, textbook-based instruction (TBI). The review focuses on studies comparing CBI and TBI, the use of CBI in grammar learning specifically, and the theoretical framework supporting CBI's efficacy.

2.1. Computer-Based vs. Traditional Grammar Instruction

Computer-Based Instruction (CBI) and Traditional Book-based Instruction (TBI) are the two primary modes of grammar instruction examined in the present study. CBI encompasses digital exercises like gap-filling and word-order online activities, that allow learners to engage with and acquire grammatical knowledge independently. These exercises often provide instant feedback, scores, and opportunities for review (Rababah & Ghaleb, 2007). TBI, on the other hand, relies on textbooks and printed materials for grammar instruction

A solid understanding of grammar is fundamental for English language learners, as it enables them to express ideas, meaning, and intentions effectively in both spoken and written communication (Crystal, 2004). Both CBI and TBI can be effective in teaching grammar, the choice between them often depends on contextual factors. For instance, in events like the COVID-19 pandemic, the use of CBI became essential due to the shift towards online learning (Abu-Seileek, 2007; Lee, 2000; Oz et al, 2015).

Technology and the considerable use of computer technologies have had an enormous impact on second-language classrooms over the last decades. Garcia and Arias (2000) conducted a comparative study on motivation and learning through TBI and CBI. They found that CALL facilitates learners' motivation, autonomy, and independent learning. Moreover, they concluded CALL game-based exercises provide the learners with immediate feedback and adequate information regarding grammatical patterns. However, Bayraktar (2002) explored learners' perceptions of the usability of Computer-Assisted Instruction (CAI) in learning English language skills. The students at the secondary and college science were recruited and they were divided into CAI and TBI groups. The survey was comparative research and results revealed that the learners of CAI were positive toward digital learning compared to TBI. Results also indicated a small positive effect when TBI was used and digital materials were used as supplementary materials. Jarvis and Szymczyk (2009) examined learners' perceptions of the efficacy of CBI and TBI in learning grammar. They found out learners felt an independent atmosphere in grammar practice since the learners used these tasks outside the classroom without the teacher's help. The learners reported that they prefer digital tasks and books because these materials are accessible and the exercises are very attractive. The grammar exercises are found to be varied, flexible, and effective despite the learners' lack of sufficient computer literacy (Bodaghi & Ghapanch, 2023).

2.2. CBI in Learning Grammar

Using a computer and its dependent instruments for learning and teaching English has attracted many researchers' attention to investigate the profitability and effectiveness of this set of instructional tools. The increasing desire of people for computers and enjoyment of digital instructions led Jalali and Dousti (2012) to research learning grammar through computer educational exercises. If digital exercises are supposed as a part of CBI, this study focuses on the use of digital exercises in learning grammar. They examine the impact of CBI on elementary learners' grammar in a virtual platform. They recruited 58 elementary learners in an institute. However, the difference between the groups was not significant. They imply CBI motivates the participants to enthusiastically engage in learning processes (Abu Naba'h, 2012).

The other study was done by Charpentier Jiménez (2014) who explored students' opinions on the use of CBI in learning grammar. Leaners at the undergraduate level took a survey and their perceptions were concerned with the use of these technologies for learning purposes. The undergraduate learners believe that their teachers do not use CBI all the time for all courses. They also mentioned that the teachers' role should be facilitative and they need to acquire computer literacy and guide the learners on how to use digital software to learn grammar (Gharhbaghi & Hosaini, 2023). However, these results cannot be generalized to other circumstances since the learners who study grammar at other levels of English language proficiency may show different perceptions.

Omari (2015) researched the impact of CBI on learning the Arabic language as a Foreign Language (AFL) at a university in the US. Results indicated that technology can boost language learning, interaction, and communicative abilities. In addition, the study revealed technologies have affected people's interactions and social relationships and the way and shape of instruction. Communicative abilities through digital platforms could be possible to a great extent. Online exercises showed learners' interaction via technology can boost grammar exercises, support language learning, provide available exercises, and strengthen hybrid courses. Omari (2015) also found that technology boosts learning the Arabic language as a foreign and the participants were persuaded to use more computer tools to enhance their proficiency level.

In short, the literature on using CBI compared to TBI has shown the effectiveness of CBI in learning the English language, especially in EFL contexts. In a few cases (e.g., Jalali & Dousti, 2012) the difference is not significant; however, the CBI groups outperformed the TBI ones. This controversial result in the literature of the two approaches to using game-based instruction of learning grammar has made the researchers explore a possible response to this problem. Literature also shows that there are rare studies to explore the effect of CBI on elementary EFL learners' specific exercises of gap-filling and word order. These two grammar exercises are at the level of sentence construction.

2.3. Theoretical Background

CBI could be regarded as a pedagogical aid that enhances the development of EFL learners' grammatical competence since it helps the students to acquire grammatical patterns and exercises with appropriate feedback explanation, and out-of-class activities. CBI can be a diagnostic tool to have the areas of difficulty and take appropriate remedial action. To support

this view, Castillo-Cuesta (2022) added that the use of digital instructions helps improve EFL learners' writing skills. Moreover, Masadeh (2022) focuses on learning language skills through game-based instruction. These digital exercises could be a student-centered approach to learning grammar. These exercises boost learners' autonomy and self-confidence since the learners can follow exercises and explanations of the grammar software without the help of the teacher. Instructions should be considered an integral part of the language digital syllabus. Therefore, CBI can provide EFL learners with self-study activities that minimize the role of teacher-centered approaches to teaching grammar in a traditional manner. This digital instruction can be used in every stage of learning and grammar in particular to obtain complete progression. In the first stages, it could be in the manipulated form and then be in the shape of free practice (Gorjian et al., 2011; Lys, 2013). In addition, Gozcu and Caganaga (2016) note the same idea regarding the student-centered activities or game-like exercises that can be used in virtual classes. Educational instructions especially computer- or internet-based ones have attracted many researchers (e.g., Gorjian, 2008; 2017) who state not only children but also countless people love playing with instructions since they are fun and interesting for them.

3. Method

The research design employed a quasi-experimental approach, incorporating a pretest, posttest, and an intervention focused on teaching grammar through CBI and TBI.

3.1. Participants and Setting

The research population consisted of 104 junior high schools who had passed several special English courses based on the "Tip Top" and "American Get Ready" books, written by Ivan Ich Williams and Majid Tavanaie (2014) and Felicity Hopkins (2001), respectively. These courses were offered as extracurricular activities. The research population took Pearson Longman's (2007) placement test, and 90 students who gained the elementary band score between 18 and 29 out of 60, equivalent to the A1-A2 level on the Common European Framework of Reference (CEFR), were selected as the participants of the study. 90 students were randomly selected from among 104 students as the participants of the study. They were grouped into two experimental CBI groups (i.e., WOG, GFG) and a control TBI group (CG) using a random sampling method. The participants completed consent letters and information about the purpose of the study. They were between the ages of 15 to 18 (Mean=16.32, SD=1.05) and included both male and female students who were native speakers of the Persian language. Each group comprised 30 participants and had the same teacher and materials.

3.2. Instrumentation

Four research tools were used to conduct the study:

3.2.1. The Placement Test. The Placement Test (Pearson Longman, 2007) included grammar exercises designed for English language learners at the A1–A2 proficiency levels. This diagnostic grammar test contained 60 multiple-choice items aimed at assessing learners' understanding of various grammatical concepts, including tenses and parts of speech. It provided varied items regarding tenses, parts of speech, etc. It was used to homogenize the

sample based on the students' current grammar proficiency. Participants were allotted 60 minutes to complete the test.

3.2.2. The Pilot Study. A pilot study was conducted to validate the grammar test. Twenty elementary-level students, separate from the main study participants, took the test. The KR-21 formula was used to measure the internal consistency of the tests. Three EFL experts reviewed the items and confirmed the content validity after several revisions (Mackey & Gass, 2005). The reliability of the tests was estimated at (r=.81 and r=.95, respectively). The content validity was confirmed after revising or changing several items.

3.2.3. Materials. The study used grammatical patterns from junior high school textbooks, which are taught throughout Iran. The grammatical points included subject-verb agreement, prepositions of time and place, adverbs (i.e., manner, time, and place), and question and negative forms. The pretest and posttest were identical, consisting of 20 multiple-choice items based on these structures.

3.3. Procedures

Ninety junior high school students learning English at an institute were selected based on a placement test and randomly divided into three groups. One of the experimental groups received word order instruction, another one received gap-filling instruction through CBI, while the CG group received TBI. A treatment of CBI course was designed to enhance junior high school students' grammar. In treatment sessions, two types of CBI and one TBI method were used as the source for practicing grammar (Mackey & Gass, 2005).

At the beginning of each session, grammar explanations were provided and learners did CBI exercises of word order and gap-filling for 20 minutes on websites such as www.englishgrammar.org/gap-filling-exercise/,www.educaplay.com/learning-resources/306-gap_fill_exercise, and www.baamboozle.com/game. Students were informed that the exercises were digital and game-based to enhance motivation. After that, the grammatical rules were announced and the students were required to find it on the intended website the researcher read the instructions for students and guided them to do the exercises online.

Experimental groups received a synchronous CALL version of the CBI word order and gap-filling exercises in each treatment session. The virtual classes demonstrated the feasibility of the experiment and helped determine the approximate time needed for instruction. All the groups worked on five grammatical rules from junior high school books over two months, with six sections covered each month. Each 30-minute session included teaching a rule and practicing exercises on the computer. For CBI, websites such as 15worksheets.com and www.engworksheets.com were selected based on ease of instruction and computer feedback availability. The exercises featured downloadable worksheets, feedback, and relevance to the material.

In the word order instruction, students clicked on the words to form correct sentences, while in the gap-filling instruction, they completed sentences by filling in gaps based on grammatical rules. Students could check their scores and speed at the end of each exercise. Screenshots of these exercises are available online (Figures 1 and 2).

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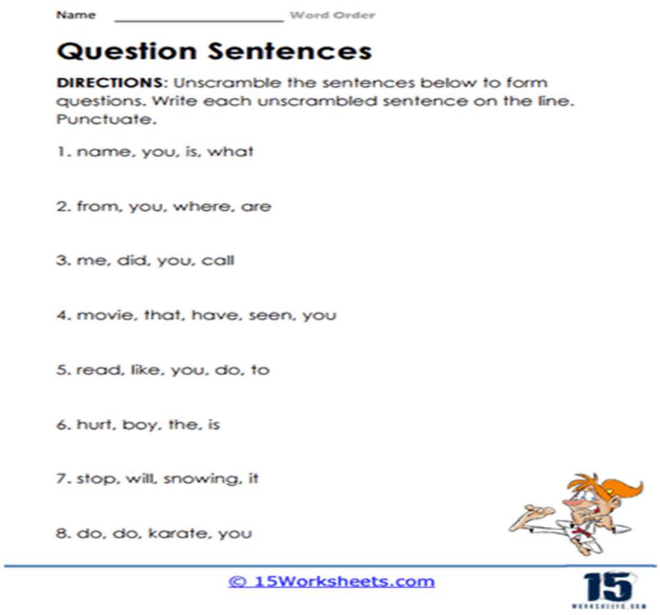
Figure 1

Screenshot of a Word Order Exercise



Name _____ Word Order

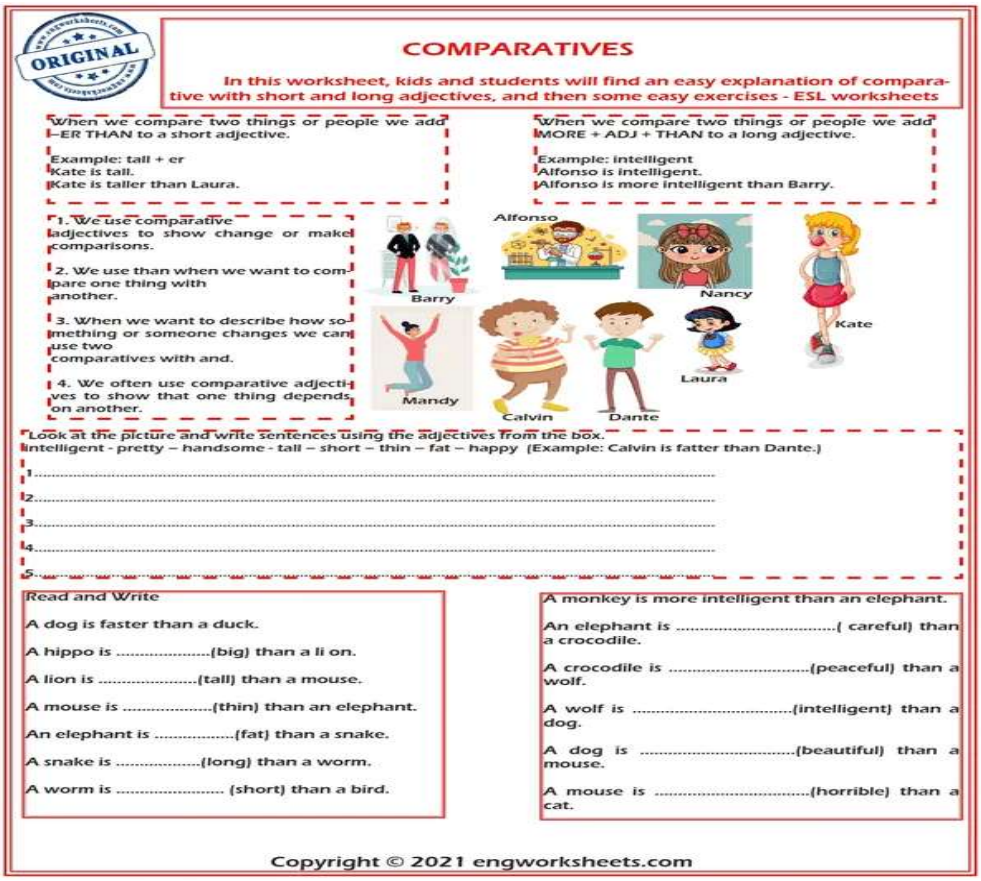
Question Sentences

DIRECTIONS: Unscramble the sentences below to form questions. Write each unscrambled sentence on the line. Punctuate.

1. name, you, is, what
2. from, you, where, are
3. me, did, you, call
4. movie, that, have, seen, you
5. read, like, you, do, to
6. hurt, boy, the, is
7. stop, will, snowing, it
8. do, do, karate, you

Figure 1

Screenshot of a Filling Exercise



ORIGINAL

COMPARATIVES

In this worksheet, kids and students will find an easy explanation of comparative with short and long adjectives, and then some easy exercises - ESL worksheets

When we compare two things or people we add –ER THAN to a short adjective.

Example: tall + er
Kate is tall.
Kate is taller than Laura.

When we compare two things or people we add MORE + ADJ + THAN to a long adjective.

Example: intelligent
Alfonso is intelligent.
Alfonso is more intelligent than Barry.

1. We use comparative adjectives to show change or make comparisons.
2. We use than when we want to compare one thing with another.
3. When we want to describe how something or someone changes we can use two comparatives with and.
4. We often use comparative adjectives to show that one thing depends on another.

Barry, Alfonso, Nancy, Kate, Mandy, Calvin, Dante, Laura

Look at the picture and write sentences using the adjectives from the box.
intelligent - pretty – handsome - tall – short – thin – fat – happy (Example: Calvin is fatter than Dante.)

1.....
2.....
3.....
4.....
5.....

Read and Write

A dog is faster than a duck.
A hippo is .....(big) than a li on.
A lion is .....(tall) than a mouse.
A mouse is .....(thin) than an elephant.
An elephant is .....(fat) than a snake.
A snake is .....(long) than a worm.
A worm is ..... (short) than a bird.

A monkey is more intelligent than an elephant.
An elephant is .....(careful) than a crocodile.
A crocodile is .....(peaceful) than a wolf.
A wolf is .....(intelligent) than a dog.
A dog is .....(beautiful) than a mouse.
A mouse is .....(horrible) than a cat.

The control group participated in the TBI. Each session followed the PPP (Presentation, Practice, Production) approach to teach grammar. Five specific grammatical rules were emphasized, and participants engaged in various tasks and exercises in the class. Feedback is provided either by the students or by the teacher. The sessions were run in a teacher-centered manner, with learners adhering to the teacher's instructions and practicing grammatical patterns at the end of the instructional processes. Generally, the classes were conducted in a face-to-face (F2F) format, and students utilized their textbooks.

To control for the effects of intervening variables, the materials, time allocation, and teachers were consistent throughout the study (Creswell & Creswell, 2017). The grammatical rules selected for instruction were aligned with the study's objectives, the student's proficiency level, and the relevant notions and functions presented in their course textbooks.

All participants took the grammar posttest and data were collected and analyzed using the Kolmogorov-Smirnov (K-S) normality test data. ANOVAs were used to compare groups' performance in grammar knowledge between the pretest and posttest.

4. Results

4.1. Test of Normality

To test whether data have come from a normal distribution, the KS test was used and the results are presented in Table 1.

Table 1
One-Sample Kolmogorov-Smirnov Test

Groups' Tests	N	Mean	SD	Statistics
WOG Pretest	30	16.15	2.56	.79
GFG Pretest	30	15.5	2.72	.74
CG Pretest	30	15.45	2.18	.87
WOG Posttest	30	22.85	5.28	1.05
GFG Posttest	30	19.70	3.88	.80
CG Posttest	30	16.00	3.46	.73

As Table 1 displays, the statistics are greater than p=0.05. In other words, there is a normal distribution of the data around the mean and parametric statistics can be run to compare the groups' means in the pretest and posttest.

4.2. Groups' Pre-tests

Descriptive statistics of the groups' means of the pretest include mean, SD, max, and min of the scores in Table 2. It indicates the close mean scores of the three groups in the pretest. But to be sure that the pretest scores are homogeneous and there is not any significant difference at the beginning of the study among the participants, ANOVA is presented in Table 3.

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Table 2
Descriptive Statistics (Pre-tests)

Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Word Order	30	16.15	2.56	.57	14.95	17.34	10.00	20.00
Gap-filling	30	15.55	2.72	.60	14.27	16.82	8.00	19.00
Control	30	15.45	2.18	.48	14.42	16.47	11.00	19.00
Total	90	15.71	2.47	.31	15.07	16.35	8.00	20.00

Table 3 shows the pretest is not statistically significant (F=.45, p=.63>p.05). In other words, before the intervention, the groups were statistically homogeneous and could start the treatment modes of word order, gap filling, and PPP.

Table 3
One-way ANOVA (Pre-test)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	5.73	2	2.86	.45	.63
Within Groups	356.45	87	6.25		
Total	362.18	89			

4.3. Groups' Post-tests

After analyzing the post-test results, the scores were analyzed through the ANOVA and the performance of students in the post-test revealed some effects of the WOG, GFG, and CG. The groups improve in the mean score of the post-test. But to measure the statistical difference among them, descriptive statistics is primarily run in Table 4.

Table 4
Descriptive Statistics (Post-tests)

Groups	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Min.	Max.
					Lower Bound	Upper Bound		
Word Order	30	22.85	5.28	1.18	20.37	25.32	9.00	29.00
Gap-filling	30	19.70	3.88	.86	17.86	21.51	9.00	25.00
Control	30	16.00	3.46	.77	14.37	17.62	7.00	21.00
Total	90	19.51	5.06	.65	18.20	20.82	7.00	29.00

Table 4 depicts the posttest means of WOG, GFG, and CG are 22.85, 19.70, and 16.00 respectively. It is seen some progress in students' scores because of the treatment effect. Figure 3 illustrates the differences in the groups' means in both the pretest and posttest.

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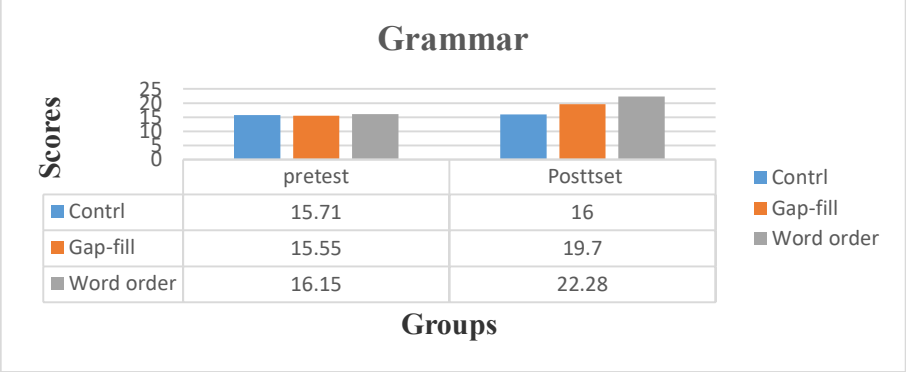
Figure 3
Pretest and Posttest Scores of Three Groups



Since there is a need to know the statistical mean differences in the three groups, the ANOVA is run to measure the effect of the intervention on learners' grammatical knowledge. Table 5 displays three groups' means of the posttest (F=12.82, p=001<.05) with df 2/87. Since the exact groups' mean differences are needed to evaluate the effectiveness of each treatment mode, the follow-up Scheffe test was calculated in Table 6.

Table 5
One-way ANOVA (Post-test)

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	470.23	2	235.11	12.82	.001
Within Groups	1044.75	87	18.32		
Total	1514.98	89			

Table 6 no significant difference between the posttest means of the WOG and GFG (Mean difference=3.15, p=.075>.001). But there is a significant difference between the WOG and GFG with CG (Mean difference 6.85 and 3.70, p=.001 and .030<.05). In other words, WOG and GFG outperformed the CG. However, the GFG influenced the learners' scores not as much as WOG.

Table 6
Follow-up Scheffe test (Posttest)

(I) Groups	(J) Groups	Mean Difference (I-J)	Sig.
Word Order	Gap-filling	3.15	.075
	Control	6.85*	.001
Gap-filling	Word Order	3.15	.075
	Control	3.70*	.030
Control	Word Order	6.85*	.001
	Gap-filling	3.70*	.030

5. Discussion

Data analysis provided the researcher's responses to the research questions (RQs). The first RQ addresses the impact of Content-Based Instruction (CBI) exercises, specifically Word Order Games (WOG) and Gap Fill Games (GFG), on EFL learners' grammar. Results indicated learners in the CBI groups outperformed those in the control group (CG) who received Traditional-Based Instruction (TBI). This result is consistent with Pirasteh (2014), who found CBI to be effective in enhancing Iranian EFL learners' grammar skills. This significant difference was due to using technology that provides learners with various online grammar tests, appropriate feedback, and opportunities for independent learning. Digital exercises are available anytime and anywhere, with mobile phones serving as useful tools for learners to practice grammar exercises during their free time or while commuting. Abu Naba'h (2012) also discussed the effectiveness of online exercises in grammar learning through CBI, noting that students in the WOG group performed those in the GFG group in the grammar post-test.

Results also confirmed CBI's superiority over TBI in facilitating grammar learning improvements. This viewpoint is supported by Korkmaz (2013) and Saleh and Ahmed Althaqafi (2022), who advocated for entertaining instructional methods as an optimal approach to teaching English to young learners. Unlike the CG, where TBI's teacher-centered methods led to passive learning and diminished attention spans, the CBI environments of WOG and GFG were engaging and enjoyable. The results are consistent with Clark and Endres (2021) since they support the effectiveness of CBI in learning grammar. This is aligned with CBI instructions that affected students' grammar learning. Despite these insights, not all exercises yielded the same results, contrasting with Jalali and Dousti (2012) who observed no significant difference between CBI and TBI approaches. However, the consensus, as stated by various studies including Gorjian (2008), is that CBI significantly boosts learners' grammar achievements. The improvement of grammar learning in the computer-based word order and gap-fill instructions can be ascribed to several factors, including the engaging, multisensory effect of the instructions, colorful pages, variety of shapes, sounds, interesting cues, immediate feedback, etc. Educational instructions especially computer- or internet-based ones have attracted many researchers who state not only children but also countless people love working with online instructions since they are independent exercises and can be followed without the help of teachers.

The second RQ examined the differences between CBI and TBI exercises in learning grammatical structures among EFL students. Once again, the experimental groups excelled beyond the CG, likely due to the latter's reliance on teacher-centered approaches and the limited scope of textbook exercises. The other reason can be the lack of time allocated to class exercises. In large classes, teachers cannot check all learners' tasks and give appropriate feedback. In contrast, computer-based exercises provide the learners with immediate feedback and correction. In some cases, explanations, hypermedia, and online resources are at hand and the learners feel self-confident and independent learning outside the class environment. This is consistent with Gorjian (2008), who addresses the effectiveness of CBI in learning writing skills via email discussion. Mean scores of the post-test showed that students in the experimental groups got better grammar achievement in the post-test.

During the treatment sessions, students engaged more deeply with grammatical structures via CBI, utilizing online versions of their textbook exercises. The online exercises were interesting to them since they are motivated to search other online resources and gain grammar knowledge when they have free time outside the class. Direct online instruction could be a great help as this finding is noted by Abdulmalik Ali (2018) who explored the effect of CBI and web-based exercises that facilitate English grammar instruction. As a result, online instruction impacts positively different aspects and phases of language learning, in particular, grammar. Castillo-Cuesta (2022) recognized the positive impact of online instruction and CBI on various aspects of language learning, including grammar, reading, and writing skills. Dwi Laksmita et al.'s (2020) findings also support the significant difference between the CBI and TBI's grammatical competence after the intervention. The COVID-19 pandemic provided EFL teachers with a good experience of using CBI to facilitate EFL learning. The current study shows the usefulness of CALL in learning foreign languages and develops these modes (i.e., word order and gap filling) in Iranian schools and universities.

Grammar activities are often considered to be very boring. These online grammar exercises may trigger learners' motivation to do exercises in a game-like mode since a shift from F2F classes to digital classes of game-based instruction can offer something different. Results show that computer-based word order instruction was effective on the students' grammar learning because this type of instruction involved the students in the making sentence processes and the students were challenged with the arrangement of the words, not with the different options that should have had all characteristics of the correct choice for filling the gap. Therefore, the students tried to find another one. However, in the gap-fill instruction, students put the words into the gaps to complete the sentence based on the grammatical rule. In doing this type of exercise, the students should have mastered and focused on the meaning of the words as well as their grammatical characteristics.

6. Conclusion

The researchers investigated whether the application of word order and gap-filling exercises, both as computer-based instruction (CBI) and text-based instruction (TBI) exercises, affected elementary students' grammar learning. Using word order and gap-filling exercises in CBI significantly improved the students' grammar learning. However, while gap-filling exercises in CBI had a slight effect on junior high school students' grammar competence, both experimental groups significantly outperformed the control group (CG). Thus, CBI, particularly when utilized as online or internet-based instruction (IBI), specifically influenced junior high school students' grammar learning. In addition, online word order instruction showed more progress in students' grammar compared to gap-filling instruction or traditional Presentation, Practice, and Production (PPP) exercises. In CBI word order instruction, the grammatical hints and explanations provided by the computer can positively influence students' grammar learning ability. In CBI, grammar-based exercises offer more support for students who prefer focusing on various exercises that are not teacher-based. Computer-based gap-fill instructions and associated grammar-based exercises positively impact students' grammatical competence more than the traditional control group. Free and independent grammar learning may motivate junior high school students to learn grammar and improve their grammar.

Computer-Assisted Language Learning (CALL) enhances educational processes, supporting junior high school students in learning grammar.

Pedagogical implications suggest teachers should incorporate online classes and related websites as mandatory or obligatory courses for learning grammar. CBI offers several privileges that can alleviate the burden of teaching grammar, especially in large classes, and motivate students, particularly young students, through multisensory factors of CBI such as coloring pages, voice, and music. Additionally, it can reduce the affective filters like anxiety or stress which are often high levels in teenage classrooms. Applying CBI in grammar-based exercises for teaching junior high school students intends to promote their grammar learning in or out of class. Students can benefit from using these instructions in several ways: first, the engaging nature of the instructions can maintain their interest over extended periods, preventing boredom, second, they can promote not only grammar learning but also writing and reading skills (Shirkhani & Poorhadian, 2024). Finally, grammar-based exercises on certain websites can help students complete tasks independently and build self-confidence. If they make a mistake, they can repeat the task without the embarrassment they might feel in a face-to-face (F2F) class where mistakes could lead to criticism from teachers or peers.

The main limitation of the study is its focus on a limited range of grammatical points taught via CBI and TBI. Future studies could explore other instructional methods like Task-based language teaching (TBLT) instruction or Communicative language teaching (CLT) for teaching grammar. Another limitation is the focus on elementary students; future studies could compare these instructional modes among intermediate or advanced students. Additionally, this study did not consider other language skills such as reading, writing, listening, or speaking. Future research could investigate these skills or subskills. Moreover, This study examined a few grammar websites. However, future studies could explore additional websites like Quill, Noredink, WriQ, Grammarly, Easybid, EducationCity, IXL, ReadWriteThink, growgrammar, etc.

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