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Effects of Motivational, Metacognitive, and Technology-Based Scaffolding on Listening Ability of Iranian ESP Students

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Abstract

This research seeks to scrutinize how different scaffolding techniques affect the listening skills of Iranian students enrolled in English. These students often struggle with developing their listening skills, which are vital for effective communication in academic and professional environments. This investigation implemented a quasi-experimental framework and comprised 80 intermediate Iranian ESP students who were randomly divided into four experimental groups (motivational, metacognitive, technology-based) and a control group. The participants' listening skills were assessed through pre-tests and post-tests, and the treatment involved the use of scaffolding techniques, including a software program that incorporated text, graphics, and audio elements. The program presented materials through various modalities, such as vocabulary sections, stories, exercises, and games. The outcome revealed that all three types of scaffolding led to significant improvements in the listening abilities of the ESP learners. The experimental groups performed better than the control group, with the technology-based group showing weaker performance compared to the motivational and metacognitive groups. The results carry significant relevance for English education in Iran, as they can support a basis for enhancing pedagogical strategies to upgrade listening skills in academic and professional contexts.

Keywords: ESP; Listening skill; Metacognitive scaffolding; Motivational scaffolding; Technology-based scaffolding

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1. Introduction

There is broad agreement that listening is vital for learning a foreign language, as it is a complex process that involves understanding and interpreting spoken messages in real time. This skill is considered the most challenging to master compared to other language skills. Recent research has shed light on the most effective ways of learning this skill, highlighting the importance of listening in developing learners' communicative ability (Morley, 2001; Rost, 2001; Lynch, 1998; Mendelsohn, 1998; Vandergrift, 2004). Listening is also a crucial component of linguistic skill measurement, and it can be used to evaluate the efficacy of language courses. Non-native speakers often find listening in a foreign language to be difficult and crucial, and even highly proficient language learners seek opportunities to improve their listening ability (Huang, 2006; Ferris &

Tag, 1996). In listening instruction, it is important to specify the approaches, methods, techniques, and strategies used in the classroom, identify effective pedagogical strategies, and establish the expected level of learners' performance and evaluation yardsticks (Richards, 2008).

Several techniques are utilized by language instructors to assist language students in improving their language abilities. One widely recognized method in language learning is scaffolding, which is a concept explored in Vygotsky's Zone of Proximal Development (ZPD) theory as discussed by Lantolf and Thorne (2006). According to Vygotsky's theory, scaffolding serves as the main process of internalization and is a crucial element in developmental activities within the ZPD, as highlighted by De Guerrero and Villamil (2010).

According to Vygotsky (1987), the concept of the zone of proximal development (ZPD) pertains to the disparity between a learner's existing level of development, as evidenced by their ability to independently solve problems, and their potential maturity level, as demonstrated through decision-making with the direction of adults or engagement with more proficient colleagues. The ZPD essentially underscores the capacities that they have not yet reached full maturity, but are currently undergoing development and unfolding (Vygotsky, 1987). Through engagement in specific activities, a learner can acquire the capability to handle these tasks independently, thereby manifesting progress and advancement. Consequently, the ZPD encompasses the functions that are presently undergoing maturation and are destined to attain complete maturity, but at present, they exist in an incipient state (Vygotsky, 1987).

The concept of scaffolding has been expanded to the learning context through the integration of technology, such as computers (Lai & Hwang, 2014). The operation of technology-based scaffolding for language learning has gained momentum in recent years. (Chen & Lin, 2015). Chen and Lin (2015) argue that technology-based scaffolding can be designed to provide learners with targeted support that is tailored to their individual needs. This can include features such as interactive multimedia and adaptive feedback systems. Lai and Hwang (2014) suggest that technology-based scaffolding can be used to support collaborative learning, as it allows learners to work together and provide mutual support while engaging with the learning materials.

Motivational and metacognitive scaffolding are two types of scaffolding that can be utilized to assist learners in language learning. Motivational scaffolding involves providing learners with support to foster their motivation and involvement in the educational experience (Wang & Wang, 2017). This can include strategies such as establishing attainable objectives, giving affirmative feedback, and fostering a nurturing educational setting. The importance of motivational scaffolding lies in its ability to enhance learners' motivation and engagement, which in turn can lead to improved learning outcomes (Ryan & Deci, 2020).

Metacognitive scaffolding, on the other hand, involves providing learners with support to develop their metacognitive skills, such as developing, overseeing, and assessing their personal educational progress. (Panadero & Jonsson, 2013). This can include strategies such as providing prompts for reflection, modeling effective learning strategies, and encouraging learners to self-assess their learning. The importance of metacognitive scaffolding lies in its ability to promote learners' self-regulated learning, which is an important element in a successful educational system (Zimmerman, 2013).

This concept and the scope of scaffolding have been controversial and often used loosely in research, despite the increasing interest in investigating them. Previous research has demonstrated that scaffolding can improve students' learning, but there is a need for further exploration of the benefits of using scaffold-based techniques to enhance learner involvement, particularly in English for Specific Purposes (ESP) contexts. The current research aimed to investigate the impact of technological, motivational, and metacognitive scaffolding on Iranian EFL scholars' listening skills. One major problem observed by the researcher is related to ESP students learning technical and vocational English at the university, where scaffolded activities are not commonly used, and motivation levels are low. Therefore, the application of scaffolded metacognitive strategies could be promising in ESP contexts to enhance learners' motivation levels and language skills.

2. Review of Literature

Sociocultural theory (SCT) has been a popular framework for understanding learning and development in various fields, including second language acquisition (SLA) (Lantolf & Thorne, 2006; Poehner & Lantolf, 2019). According to SCT, learning involves socializing and the implementation of cultural aids, such as language, to mediate learning (Vygotsky, 1978). Through interaction with others, learners engage in a process of co-construction of knowledge, in which more knowledgeable individuals guide less knowledgeable ones to advance their understanding (Thorne & Reinhardt, 2008). One of the fundamental principles in SCT is the zone of proximal development (ZPD), which denotes the difference between the abilities that learners

can demonstrate autonomously and those that they can accomplish with the assistance of a more knowledgeable individual (Vygotsky, 1978). In SCT, learning occurs when learners are scaffolded to perform tasks that they cannot do independently but can do with assistance (Lantolf, 2000). Scaffolding involves providing learners with temporary support that helps them complete a task that they would not have been able to do alone (Wood, Bruner, & Ross, 1976). This support can include modeling, cueing, feedback, and other strategies that assist learners in advancing from their present level of comprehension to a more advanced level (Thorne & Reinhardt, 2008). A new examination has indicated that SCT is a beneficial framework for comprehending SLA and constructing successful language teaching strategies, as discovered by recent research undertaken by Poehner and Lantolf (2019). For instance, Poehner and Zhang's (2016) research delved into the influence of dynamic assessment, based on SCT, on the progression of Chinese as a second language. The results revealed that dynamic assessment, which involves guiding learners through tasks, effectively enhanced language development. Another recent inquiry delved into the role of teacher scaffolding in the English writing abilities of Chinese college students. The findings demonstrated that teacher scaffolding, including giving students feedback and modeling, noticeably enhanced their writing performance.

Motivational scaffolding has been highlighted in recent studies as a crucial factor in encouraging learners to remain actively involved and determined in problem-solving activities. Alias (2012) distinguished three primary forms of scaffolds: cognitive, metacognitive, and affective or motivational. While cognitive and metacognitive scaffolds concentrate on supplying learners with assistance and direction pertaining to material and techniques, motivational scaffolds strive to elevate learners' motivation and participation in the educational journey (Alias, 2012).

However, recent studies have shown that motivational scaffolding has received less attention than cognitive and metacognitive scaffolding in research on scaffolding (Belland et al., 2013; Chen & Lin, 2015). In order to bridge this divide, scholars have proposed the implementation of scaffolds that prompt and incentivize learners' self-assurance while also clearly demonstrating learners' accomplishments (Alias, 2012). Chen and Lin (2015) further emphasizes the criticality of scaffolds that cater to learners' psychological characteristics that impact their learning, in addition to their cognitive abilities. To cultivate both intrinsic and extrinsic motivation, scholars have proposed the utilization of theoretical frameworks such as the concept of the zone of proximal development, alongside the principles of self-determination theory (Deci & Ryan, 2008; Chen & Lin, 2015). Practical recommendations for scaffolding based on motivational principles have been articulated by Belland et al. (2013), encompassing strategies such as emphasizing task value, enhancing mastery objectives, fostering a sense of belongingness, facilitating emotional regulation, instilling expectations of success, and nurturing autonomy. These strategies align with scaffolding techniques like peer modeling, which aids learners in perceiving tasks as appropriately challenging, striking a balance between excessive difficulty and excessive ease, thereby fostering an optimal challenge mindset (Smith et al., 2013; Thoman et al., 2013). Previous research has inquired how the motivational scaffolds affect both learning and motivation and proposed a comprehensive self-regulation model, emphasizing the interconnectedness of motivation, metacognition, and affect as central components. The conceptual connection between motivation and metacognition is well-established. Empirical studies exploring this connection are limited. There is a lack of research on the implementation of motivational or affective scaffolds in educational contexts (Alias, 2012). The need for further research on utilizing scaffolds to foster motivation is highlighted (Belland et al., 2013; Chen & Lin, 2015).

This research examined the impact of motivational assistance and metacognitive exercises on the collective metacognitive development of Iranian ESP students, following the research gap identified by Panadero and Jonsson (2013). Analysis of oral language teaching methods revealed the significance and efficacy of scaffolding, from a constructivist viewpoint, in contemporary educational research. The research findings emphasize the usefulness of scaffolding in oral English instruction and provides a useful framework for designing effective scaffolding strategies for EFL writing instruction.

In the qualitative research conducted by Cheung (2018), the impact of educators' utilization of motivational techniques on students' motivation in writing was examined. A total of 344 first-year undergraduate students participated in the study by providing their input through classroom observations and surveys. The findings indicated that the writing instructors' implementation of strategies for instilling primary students' engagement in the learning environment greatly improved students' optimistic attitude and self-assurance within the writing course. Ahmad et al. (2019) conducted a study to explore the productivity of employing metacognitive scaffolding within a social setting to enhance students' academic achievement. The researchers adopted a framework, which focused on two primary mechanisms of

metacognitive scaffolding: i) facilitating reflective writing (referred to as MS3), and ii) guiding students to engage in metacognitive processes during their learning (referred to as MS4). The study commenced with the administration of a survey to gauge students' perceptions regarding the utilization of Facebook as a platform for instructor scaffolding. Subsequently, the researchers examined changes in students' learning outcomes following the implementation of metacognitive scaffolding. The study comprised twenty-three undergraduate students who were enrolled in a telecommunication and networking course. Data were collected through a questionnaire, online discussions conducted on Facebook, and a performance test. The results indicated that Facebook proved to be an effective platform for instructor scaffolding, as students perceived it as a convenient means of communication with their lecturer. Additionally, the findings demonstrated a notable enhancement in the academic achievements of students subsequent to the implementation of metacognitive scaffolding. Javadi and Khatib (2020) conducted research that examined how scaffolding instruction influences the reading comprehension of Iranian learners of English as a foreign language. This study utilized a quasi-experimental approach, with an experimental group and a control group. The experimental group was revealed to receive scaffolded reading instruction, while the control group received conventional reading instruction. Results revealed a noticeable enhancement in the reading comprehension of learners who received scaffolded instruction, in contrast to those who received traditional instruction. The study's results provide concrete proof of the efficacy of scaffolding instruction in EFL reading education. A research study conducted by Zhang and Jiang (2021) examined the effect of online scaffolding on the writing performance of Chinese EFL trainees. The study utilized a pre-test-post-test design and divided participants into two groups: an experimental group that received online scaffolding, such as peer and teacher feedback, and model essays, and a control group that received conventional formal writing training. The findings revealed that the group with online scaffolding displayed significantly higher improvements in writing performance compared to the control group. This study emphasizes the potential of online scaffolding in enhancing the writing skills of EFL learners. Previous studies on scaffolding in English for Specific Purposes (ESP) have mainly focused on cognitive and metacognitive scaffolding, with limited attention paid to motivational and technology-based scaffolding. Given the gravity of motivation in language learning and the potential of technology to support learning, there is a need for research on the effect of motivational, metacognitive, and technology-based scaffolding on ESP learners' listening ability. This research gap highlights the necessity of conducting a study that investigates the effectiveness of these types of scaffolding on ESP learners' listening comprehension, which can provide insights into the design of effective scaffolding strategies for ESP listening instruction. Therefore, the following research questions and hypotheses were put forward:

2.1. Research Questions

RQ 1. To what extent does technology-based scaffolding affect Iranian ESP students' listening ability?

RQ 2. To what extent does metacognition-based scaffolding affect Iranian ESP students' listening ability?

RQ 3. To what extent does motivational-based scaffolding affect Iranian ESP students' listening ability?

RQ 4. What type of scaffolding has a greater impact on the enhancement of Iranian ESP students' listening ability?

2.2. Research Hypotheses

RH 1. Does technology-based scaffolding affect Iranian ESP students' listening ability?

RH 2. Does metacognitive-based scaffolding not affect Iranian ESP students' listening ability?

RH 3. Motivational-based scaffolding does not affect Iranian ESP students' listening ability?

RQ 4. There is no notable distinction between the various types of scaffolding and their effects on improving Iranian ESP students' listening ability.

3.Methodology

3.1. Design of the Study

This study adopted a quasi-experimental design with a pre-test/post-test control group format to examine the effects of motivational, metacognitive, and technology-based scaffolding on the listening ability of Iranian ESP students.

Four groups of learners were randomly formed after administering the Oxford Quick Placement Test (OQPT) to determine their proficiency level. Three groups were assigned to experimental treatments (motivational scaffolding, metacognitive scaffolding, and technology-based scaffolding), while one group served as the control group.

The independent variables were the types of scaffolding instruction, and the dependent variable was

the participants' listening performance, as measured through pre-tests and post-tests. The design controlled for potential confounding variables such as learners' proficiency level, age, educational background, and teacher-related factors.

3.2. Participants

One hundred and twenty Iranian ESP graders were purposefully chosen from a larger sample of 160 business management graders enrolled at Islamic Azad University, Najafabad Branch, Iran. The choice was determined by the performance of the members on the Oxford Quick Placement Test (OQPT), which indicated an intermediate level of English language proficiency. Four groups were formed by randomly dividing the participants, with each group consisting of 30 students. Three groups were assigned to each type of scaffolding, including technology-based, metacognitive-based, and motivational-based scaffolding and one control group. Each type of scaffolding had one group for listening instruction. Both male and female learners, ranging in age from 19 to 35 and with Persian as their native language, participated in this research. The overall count of participants was 120.

3.3. Instruments

The following instruments were employed in the present study to collect data:

3.3.1. *Oxford Quick Placement Test (OQPT)*

Utilizing the Oxford Quick Placement Test (OQPT), which is an adapted version of the Oxford Placement Test, was the initial measure employed in this research to identify individuals with a B1+ level of language proficiency. With a total of 60 questions to be completed within 40 minutes, the OQPT is divided into two parts. Those who scored between 30 and 39 on the test were considered intermediate learners and were included in the study to ensure their appropriate level of proficiency.

3.3.2. *Pre-test and Post-test*

To diagnose ESP students' listening proficiency, a listening pre-test was created using audio texts from the book "English for Business Communication" by Simon Sweeney (2003). The book focuses on developing communication skills in five key settings: interacting, placing a call, conveying information, attending sessions, and mediating agreements, and includes over 80 recordings. The listening test was a multiple-choice format using audio texts from the book, and its reliability was evaluated via a preliminary study with a smaller sample of ESP students. The KR-21 formula was used to estimate reliability, resulting in a score of 0.81, and the validity was confirmed through expert opinions. The post-tests were similar to the pre-tests using other audio texts of the mentioned book.

3.3.3. *Scaffolding Techniques*

The employment of scaffolding techniques affords learners with flexible moments to apply their consciousness, techniques, and proficiency across diverse contexts and for various purposes. In the context of this particular study, eight fundamental concepts for scaffolding-based training, which served as overarching guidelines. These principles encompass learner engagement, establishing shared goals, attuning to learners' needs and understanding, providing appropriate guidance, maintaining goal orientation, offering feedback, addressing frustration and risk, and fostering the internalization, self-sufficiency, and transferability of skills to different situations. Furthermore, scaffolding-oriented instruction should foster an affirmative learning environment, effective class conduct regulation, ongoing observing, critical thinking utilizing educational approaches, cultivation of pupils' self-monitoring, enhancement of task cost, and bolstering learners' self-efficacy beliefs. Throughout the study, the researcher pursued a structured framework to implement scaffolding-based instruction. The learners engaged in various activities, such as listening to recorded or improvised speech, extensive reading, watching movies and TV, providing positive feedback, communication games, and exchanging information. The learners were provided with a range of samples, such as chants, poems, tongue-twisters, proverbs, dialogues, songs, sketches, and plays, to fully comprehend the instruction.

3.4. Data Collection Procedure

Data collection was carried out in several stages as follows:

Participant Selection: From a pool of 160 business management students at Islamic Azad University (Najafabad Branch), 120 intermediate learners (B1+ level) were selected based on their OQPT scores.

Pre-Test Administration: A listening pre-test was developed using audio texts from *English for Business Communication* (Sweeney, 2003). The reliability of the test was established through a pilot study (KR-21 = 0.81), and its validity was confirmed by expert reviewers.

3.4.1. *Treatment Phase*

Motivational Scaffolding Group: Engaged in activities that enhanced motivation and self-efficacy, such as goal-setting, positive feedback, and collaborative games.

Metacognitive Scaffolding Group: Received instruction with prompts for planning, monitoring, and self-evaluating listening strategies.

Technology-Based Scaffolding Group: Used a multimedia program integrating text, audio, visuals, exercises, and games for listening practice.

Control Group: Received traditional instruction without scaffolded techniques.

Post-Test Administration: After the instructional period, a post-test (parallel to the pre-test but with different texts from the same book) was administered to measure the learners' progress in listening ability.

3.5. Data Analysis Procedure

The collected data were analyzed quantitatively using SPSS. Before running the main analyses, assumptions of normality, linearity, homogeneity of variances, and regression slopes were tested and met. The analysis included:

Shapiro-Wilk Test: Conducted to confirm normal distribution of listening pre- and post-test scores across groups.

Paired-Samples t-Tests: Applied within each experimental group (motivational, metacognitive, technology-based) to compare pre-test and post-test scores and determine whether scaffolding significantly improved listening ability.

One-Way ANCOVA: Conducted to compare post-test scores across all four groups (three experimental and one control), with pre-test scores as the covariate to control for initial differences.

Post Hoc Tests (Tukey's HSD): Used to identify pairwise differences among the groups.

These statistical analyses allowed the researchers to determine both the effectiveness of each type of scaffolding and the relative impact of motivational, metacognitive, and technology-based scaffolding on learners' listening skills.

4. Results

The normality assumption and other underlying assumptions for the paired-samples t test and one-way ANCOVA were examined before conducting the parametric tests. Therefore, Table 1 displays the outcomes of the Shapiro-Wilk test for normality. All p-values for the Shapiro-Wilk's test of normality exceeded 0.05, indicating that data distributions for the listening pre-test and post-test met the assumption of normality for all participant groups.The premises of linearity, equal variances, and uniformity of regression slopes were examined and found to be met for the ANCOVA tests, indicating no violations.

4.1. Results for the First Research Question

To determine the impact of the intervention, the ESP students' listening pre-test and post-test scores within the technology-based group (TBG) were analyzed using a paired-samples t-test. To assess the effectiveness of the technology-based intervention, the listening pre-test and post-test scores of ESP students in the TB group were considered through a paired-samples t-test and the outcomes are outlined in Tables 2 and 3. In Table 2, the TBG students acquired a mean score of 19.16 on the listening pre-test and 23.13 on the listening post-test. In order to evaluate if the difference between these mean scores was statistically meaningful, the researcher consulted the paired-samples t-test table (Table 3). Table 3 shows that a statistically significant distinction was observed between the listening pre-test (M = 19.16) and post-test (M = 23.13) scores of the ESP students in the TBG, $t(29) = -7.10$, $p < 0.05$; the result is graphically visualized in the bar graph in Figure 1. Figure 1 depicts that the TBG students improved considerably from the pre-test to the post-test, indicating that the first null hypothesis is disconfirmed.

Table 1. Results for the Test of Normality

Groups	Tests	Shapiro-Wilk		
		Statistic	df	Sig.
Technology-based Group (TBG)	Listening Pre-test	0.947	30	0.144
	Listening Post-test	0.954	30	0.215
Metacognitive-based Group (MCBG)	Listening Pre-test	0.963	30	0.369
	Listening Post-test	0.931	30	0.053
Motivational-based Group (MBG)	Listening Pre-test	0.937	30	0.077
	Listening Post-test	0.959	30	0.298
Control Group (CG)	Listening Pre-test	0.974	30	0.663
	Listening Post-test	0.969	30	0.500

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Table 2. Descriptive Statistics for the Listening Pre-test and Post-test Scores of the TBG Students

TBG Listening	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	30	19.16	2.03	0.371
Post-test	30	23.13	1.97	0.361

Table 3. Paired-Samples t Test Comparing the Listening Pre-test and Post-test Scores of the TBG Students

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
pre-test - post-test	-3.96	3.05	0.55	-5.10	-2.82	-7.10	29	0.000

Table 4. Descriptive Statistics for the Listening Pre-test and Post-test Scores of the MCBG Students

MCBG Listening	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	30	18.96	2.25	0.411
Post-test	30	25.03	2.26	0.413

Table 5. Paired-Samples t Test Comparing the Listening Pre-test and Post-test Scores of the MCBG Students

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
pre-test – post-test	-6.06	2.75	0.50	-7.09	-5.03	-12.06	29	0.000

Table 6. Descriptive Statistics for the Listening Pre-test and Post-test Scores of the MBG Students

MBG Listening	N	Mean	Std. Deviation	Std. Error Mean
Pre-test	30	19.26	2.37	0.434
Post-test	30	26.03	2.48	0.453

Table 7. Paired-Samples t Test Comparing the Listening Pre-test and Post-test Scores of the MBG Students

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
pre-test - post-test	-6.76	3.70	0.67	-8.14	-5. 83	-10.01	29	0.000

4.2. Results for the Second Research Question

In order to resolve this research question, the listening pre-test and post-test scores of the students in the metacognitive-based group (MCBG) were evaluated by using a paired-samples t-test.

According to Table 4, the MCBG students displayed progress as their average score increased from 18.96 on the initial listening assessment to 25.03 on the follow-up assessment. To assess whether this increase was statistically significant, the researchers conducted a paired-samples t-test analysis and recorded the results in Table 5. It could be observed in Table 5 that the *p-value* under the *Sig.* (2-tailed) The column is lower than the significance level (0.000 < 0.05); thus, it could be concluded that the difference between the listening pre-test (M = 18.96) and post-test (M = 25.03) of the MCBG students was statistically significant. This consequence is graphically visible in the bar graph in Figure 2.

4.3. Results for the Third Research Question

In order to answer this research question, the listening pre-test and post-test scores of the ESP students in the motivational-based group (MBG) were considered by a paired-samples t-test. As it could be noticed in Table 6,

the listening post-test mean score (M = 26.03) of the MBG students was larger than their listening pre-test mean score (M = 19.26), indicating that they improved as a result of being exposed to the treatment. To see if the distinction between the listening scores of the pre- and post-test MBG students was statistically significant or not, the researcher had to consult the efficacy of the paired-samples t-test below. In Table 7, because the p value was found to be smaller than the consequence level (t = -10.01, p < 0.05), it could be understood that the difference between the listening pre-test (M = 19.26) and post-test (M = 26.03) of the MBG students reached statistical significance. This result is sketched in the bar graph in Figure 3.

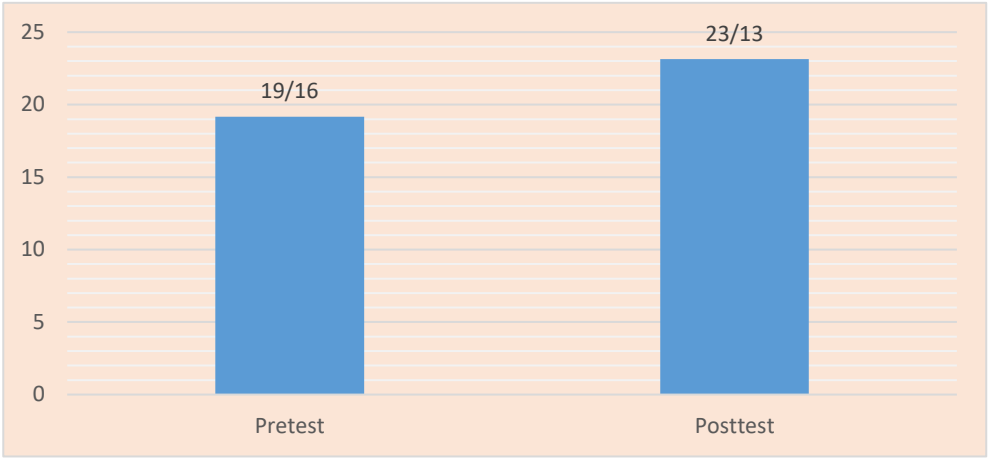

Figure 1. Listening pre-test and post-test mean scores of the TBG students

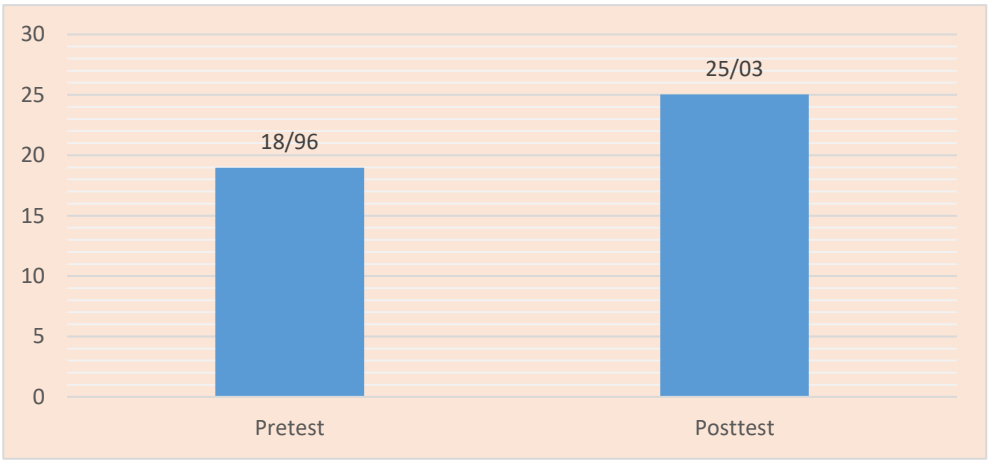

Figure 2. Listening pre-test and post-test mean scores of the MCBG students

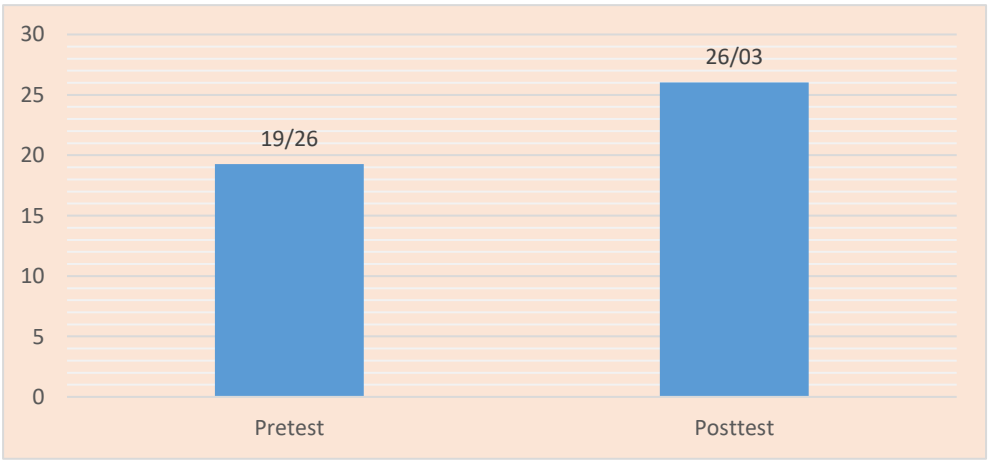

Figure 3. Listening pre-test and post-test mean scores of the MBG students

Figure 3 highlights that the MBG students experienced a significant improvement from the listening pre-test to the listening post-test, which means that the third null hypothesis was likewise not supported by this study.

4.4. Results of the Last Research Question

For investigating the final research question, the listening post-test scores of learners in the four groups (TBG, MCBG, MBG, and CG) were compared to determine if the experimental groups (TBG, MCBG, and MBG) outperformed the control group (CG). Additionally, the analysis aimed to identify any differences among the three experimental groups. A one-way ANCOVA was conducted for this purpose, with the results presented in the tables below. The listening post-test mean score of the four groups of students was found to be different from one another. To find out whether the differences among the listening post-test scores of these students were statistically significant or not, the results in the one-way ANCOVA table (Table 9) had to be examined. By consulting Table 9, one can locate the relevant p-value in the leftmost 'Groups' column and follow it across to the row below the 'Sig.' column. This p-value is comparable to the preconfigured alpha level of significance (0.05).

Table 8. Descriptive Statistics for Listening Post-test Scores of the Students

Groups	Mean	Std. Deviation	N
TBG	23.13	1.97	30
MCBG	25.03	2.26	30
MBG	26.03	2.48	30
CG	21.10	2.17	30
Total	23.82	2.90	120

Table 9. One-Way ANCOVA for the Listening Post-test Scores of the Students

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	439.45	4	109.86	22.32	0.000	0.43
Intercept	735.52	1	735.52	149.47	0.000	0.56
Pre-test	12.23	1	12.23	2.48	0.118	0.02
Groups	421.50	3	140.50	28.55	0.000	0.42
Error	565.86	115	4.92	-	-	-
Total	69121.00	120	-	-	-	-
Corrected Total	1005.32	119	-	-	-	-

Table 10. Post Hoc Test Results for Comparing the Listening Post-test Scores of the Students

(I) Groups	(J) Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
TBG	MCBG	-1.92*	0.573	0.006	-3.46	-0.39
	MBG	-2.88*	0.573	0.000	-4.42	-1.34
	CG	2.00*	0.573	0.004	0.46	3.53
MCBG	TBG	1.92*	0.573	0.006	0.39	3.46
	MBG	-0.95	0.573	0.586	-2.49	0.58
	CG	3.92*	0.573	0.000	2.39	5.46
MBG	TBG	2.88*	0.573	0.000	1.34	4.42
	MCBG	0.95	0.573	0.586	-.58	2.49
	CG	4.88*	0.574	0.000	3.34	6.42
CG	TBG	-2.00*	0.573	0.004	-3.53	-0.46
	MCBG	-3.92*	0.573	0.000	-5.46	-2.39
	MBG	-4.88*	0.574	0.000	-6.42	-3.34

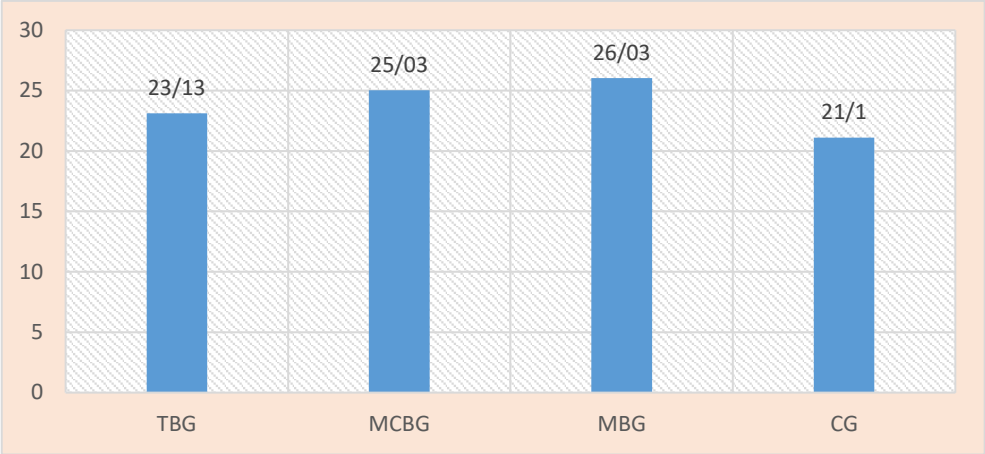

Figure 4. Listening post-test mean scores of the students

Since the p-value is less than the alpha level of 0.05 ($p < 0.05$), it indicates a meaningful difference among the four groups in terms of the listening post-test. By referring to the post hoc test table provided, one can identify the specific differences among the groups.

The pair-wise comparisons in Table 10 show that: the three experimental groups of MBG ($M = 26.03$), MCBG ($M = 25.03$), and TBG ($M = 23.13$) significantly outperformed the CG ($M = 21.10$); MBG and MCBG students were significantly better than the TBG students on the listening post-test, but the difference between the MBG and MCBG groups did not reach statistical significance. These results are also shown in the following bar graph:

As stated above, the three experimental groups were far better than the control group; among the experimental groups, MBG and MCBG were superior to TBG. All this boils down to the rejection of the final null hypothesis of the current investigation.

5. Discussion

As it was already observed, it was decided to reject the first hypothesis. Recent trends in language instruction have shifted towards the use of technology, including scaffolding techniques. Ge and Land (2003) argued that hypermedia and multimedia can be used to present scaffolding in a more dynamic and situation-specific manner. Technology has revolutionized the acquisition and imparting of language knowledge, with access to authentic materials and fast feedback through error correction facilities. Furthermore, technology-based programs allow for individualized guidance and personalized learning experiences. These results are consistent with earlier research, Greenhow and Robelia's (2009) study on the development of 21st-century competencies through social networks. Soleimani and Mirsayafi (2019) indicated that the use of multimedia resources considerably improved the listening skills of EFL learners. In sum, the use of technology and scaffolding techniques has transformed language instruction and provided learners with more engaging and personalized learning experiences.

Metacognitive scaffolding enhances metacognitive thinking, supporting planning, monitoring, and evaluating. In Ge and Land's (2003) study, students given metacognitive question prompts excelled in all stages of problem-solving: analysis, generation, justification, and evaluation. Adhering to metacognitive prompts improved problem-solving abilities in metacognitive tasks such as planning, progress monitoring, solution evaluation, and reasoning.

Bulu and Pedersen's (2010) study during ill-structured problem solving aimed to examine the impact of specific and general scaffolds on learning and problem-solving performance. Domain-general scaffolds were more effective in promoting students' observing and estimating skills than domain-specific scaffolds. As domain-general scaffolds were phased out, students successfully transferred their problem-solving abilities with their support. In contrast, domain-specific scaffolds were found to be more beneficial for facilitating comprehension of scientific concepts and problem representation compared to domain-general scaffolds. In 2019, Valencia-Vallejo et al. examined the impacts of metacognitive scaffolding on students' metacognition, academic self-esteem, and academic success, particularly for individuals with varying cognitive styles in the Field Dependence-Independence girth. The researchers conducted the study at a public university in Bogotá, Colombia, with 67 participants in an e-learning setting. The experiment consisted of two groups: one with metacognitive scaffolding in their e-learning environment and another without scaffolding. Results indicated that metacognitive scaffolding led to substantial enhancements in participants' metacognitive abilities, academic self-esteem, and academic achievements.

Utilizing a framework outlined by Jumaat and Tasir (2016), the researchers focused on two primary mechanisms of metacognitive scaffolding, namely: i) Facilitating reflective writing (MS3) and ii) Guiding students to concentrate on the learning process (MS4). Initially, a study was conducted to gauge learners' viewpoints on the use of Facebook as a platform for trainer scaffolding. Subsequently, enhancements in students' academic achievement were measured after the intervention of metacognitive scaffolding. The study involved 23 undergraduate students enrolled in a course on telecommunication and networking. Data were collected through questionnaires, online discussions on Facebook, and a performance test. The findings indicated that Facebook can serve as a useful platform for instructor scaffolding, as perceived by the students. This platform allowed for convenient communication and frequent interaction with their lecturer. Moreover, the results revealed a notable enhancement in students' academic performance following the implementation of metacognitive scaffolding.

Several investigations focused on the implementation of metacognitive scaffolding in listening for English learners demonstrated that it resulted in increased awareness and utilization of metacognitive strategies. In addition, the explicit use of metacognitive scaffolding in listening has been shown to have a positive impact on learners' comprehension and their understanding and application of metacognitive strategies. The findings of these studies revealed significant improvements in the results of the pre- and post-tests for the control group. Consistent observations have shown that an instructional perspective is crucial in guiding learners to comprehend concepts and effectively complete learning tasks through summarization and planning. Teachers' positive or negative feedback serves as a motivational scaffold for learners' responses, thereby influencing their motivation. Additionally, various other perspectives exist. Research has shown that utilizing motivational scaffolding during interactions benefits struggling readers by creating a positive and engaging environment for tackling challenging texts. Therefore, incorporating motivational scaffolds in language classes may not only motivate learners but also decrease cognitive load and support their learning process. To accomplish this, scaffolding plays a crucial role by empowering learners to monitor and organize within the educational setting and take control of their own learning (Alias, 2012). Jafarigohar and Mortazavi (2016) carried out a research project to evaluate the effects of motivational scaffolds on Iranian EFL students. The study involved 30 female participants who were given motivational scaffolds in the form of collaborative oral and written tasks. The results showed a significant increase in the usage of metacognitive techniques among these pupils. Additionally, the utilization of scaffolding created favorable conditions for learners to actively engage in listening and reading activities, ultimately leading to the improvement of their speaking skills in a foreign language. According to Belland, Kim, and Hannafin (2013), the failure to address motivation in learning settings can lead to significant issues. They proposed the use of scaffolding as a key strategy to address this problem, specifically in problem-based learning. Furthermore, their research highlights how scaffolding can positively impact motivation. After conducting their study, they concluded that computer-based scaffolds have the potential to enhance both motivation and engagement. The results of the research supported previous findings regarding the beneficial effects of scaffolding on increasing learners' self-efficacy, thereby enabling them to become independent writers. As a result, scaffolding assisted language learners, who had low levels of confidence in their writing abilities, to develop proficiency in writing tasks. Additionally, scaffolding facilitated their comprehension and mastery of writing tasks. Therefore, instilled reliance in learners, a robust feeling of self-confidence, and the capability to successfully complete tasks. Furthermore, Schunk (1990) explored various models of self-efficacy and discovered the potential impact of motivation on learning performance. The findings of the study highlighted the diverse methods in which goals can influence self-efficacy, motivation, and performance.

6. Conclusion

This research aimed to inspect the impact of technology-based, metacognitive-based, and motivational-based scaffolding on the listening proficiency of Iranian ESP learners. The ESP learners participated in various scaffolding activities, and their listening skills were assessed to measure their improvement. The findings showed a statistically significant improvement in the learners' listening abilities.

The scaffolding approach showed effectiveness due to its optimization of the language learning process and creation of a stimulating environment that benefits both instructors and learners. Scaffolding facilitated language acquisition by offering aid to learners in real-world settings, conjoining their existing awareness to the lesson content, as well as fostering collaborative learning through interaction, discussion, and negotiation.Motivational-based scaffolding significantly enhanced learners' interest and fostered a conducive learning environment. This study has important implications for language instruction. Teachers can

design various lesson plans to address the various requirements of students, considering their capabilities and providing them with various activities. Systematically-scaffolded instruction can help ESP learners bridge gaps and achieve their maximum potential.

Authors Contributions

All the authors have participated sufficiently in the intellectual content, conception, and design of this work or the analysis and interpretation of the data (when applicable), as well as the writing of the manuscript.

Availability of data and materials

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

Conflict of interest

The author states that there is no conflict of interest.

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