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The Effect of Mobile-mediated Flipped Scaffolding on EFL Learners' Autonomy in the Production of Selected Grammatical Points: Achievement and Perception in Focus

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Abstract

This mixed-method study examined the effectiveness of a mobile-mediated flipped scaffolding strategy in enhancing upper-intermediate EFL learners' autonomy and grammatical writing skills. The study also explored the treatment group's perceptions of the strategy. To this end, a sample of 58 homogenized participants in terms of general English knowledge was chosen out of 74 female upper-intermediate English language learners using a convenient sampling technique due to the availability of the participants. The data gathering tools were the Oxford Quick Placement Test (OQPT), semi-structured interviews, pretests and posttests on grammar, and the autonomy scale. Based on the independent samples t-test results, the treatment group outperformed the control group regarding autonomy and writing skills related to grammar. These conclusions were supported by the interview data, which indicated that students valued the strategy's exciting and instructive components. In summary, this research provides valuable evidence supporting the efficacy of flipped classrooms mitigated with scaffolding in resolving issues encountered by EFL students. The study also discusses the pedagogical implications, emphasizing the potential benefits of integrating such approaches into language teaching.

Keywords:
Autonomy, Mobile-mediated Flipped Scaffolding Strategy, Production of Selected Grammatical Points, Strategy-based Instruction

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Introduction

Effective communication is the cornerstone of learning any foreign language, and English plays a significant global role due to its widespread usage in cultural, political, economic, and scientific contexts (Ellis, 2011). One needs to use efficient teaching techniques to acquire a range of skills to become proficient in English. A range of teaching strategies significantly impact English learning outcomes, with scaffolding emerging as a critical tool. Jerome Bruner defines scaffolding as a "setting up" process that involves providing resources so learners can take ownership of their education (Khandelwal, 2006). Scaffolding is a teaching strategy that provides increasingly higher levels of temporary support. It is closely related to the flipped classroom model. Students who receive scaffolding can acquire higher comprehension and skill levels by providing organized support.

Information technology has transformed education and teaching with the introduction of contemporary benefits. Blended learning transforms traditional classrooms— known for their passive information reception—into dynamic, student-centered spaces. Blended learning fosters a collaborative learning environment by combining traditional instruction with online assignments (Bonk & Graham, 2006). The flipped classroom model is an essential element of blended learning that reverses the conventional learning process. Flipped classrooms allow more time for group projects and discussions during class because students watch videos and other lecture materials beforehand. One notable innovation in blended learning is the flipped classroom model, which allows for more time for interactive and collaborative classroom activities by giving students pre-class materials. This promotes autonomous learning (Han et al., 2024). This model fosters autonomy by encouraging students to be accountable for their education (Aainuddin & Perera, 2019). Mobile-assisted language learning (MALL) further enhances the flipped classroom approach by offering flexibility and accessibility. Learners can engage with language learning materials at any time and from any location, allowing them to deepen their understanding and apply concepts more effectively outside of class. This combination of flipped classrooms and MALL promotes a more autonomous and dynamic learning environment. By stressing the growth of learner autonomy, flipped teaching improves student engagement and makes it easier for students to acquire complex skills like production skills. The concept of autonomy in language learning has been thoroughly examined, with different interpretations highlighting the learner's capacity to direct their learning. Benson (2016) draws attention to the shift in global education toward ideas like lifelong learning, emphasizing autonomy as a crucial element. Autonomous students set their objectives, keep track of their progress, and evaluate their teaching methods (Benson, 2013). This self-directed strategy is consistent with contemporary educational approaches that give learner-centered methodologies precedence. Furthermore,

autonomy—which Benson (2013) defines as the ability to manage one's learning—has emerged as a critical educational objective. Students are now viewed as active participants in their academic journeys, driven by their needs and interests, rather than passive knowledge recipients. Practical tactics to support autonomous learning are needed in light of the shift toward learner autonomy. Scholars underscore the necessity of adopting learner-centered methodologies that foster self-governance, departing from conventional teacher-centered frameworks (Benson, 2001). Dörnyei (2009) defined learner autonomy as the capacity to guide learning. —For many years, learner autonomy has been a significant area of focus in education (Dang, 2012). Promoting autonomy in language learning aids students in taking an active role in their education and improves their capacity for successful target language communication. By providing structured support and promoting autonomy, incorporating scaffolding into flipped classrooms can potentially mitigate EFL learners' writing challenges. Nonetheless, disparities exist in specific research findings (Korkmaz & Mirici, 2021). Despite the potential of scaffolding and flipped classrooms, research findings on their efficacy are inconsistent (Korkmaz & Mirici, 2021). While some studies highlight the benefits of these strategies, gaps remain, particularly concerning the impact of mobile-mediated flipped scaffolding on EFL learners' grammar production and autonomy. This study addresses these gaps by investigating how a mobile-mediated flipped scaffolding approach affects EFL learners' grammar production in writing and their levels of autonomy. Additionally, the study explores learners' attitudes toward the effectiveness of this approach. Consequently, the subsequent research questions were developed:

- Does implementing a mobile-mediated flipped scaffolding strategy significantly affect EFL learners' grammar production in writing courses?
- Does implementing a mobile-mediated flipped scaffolding strategy significantly affect EFL learners' autonomy?
- What are the attitudes of EFL learners towards (in) adequacy of mobile-mediated flipped scaffolding strategy in grammar production and autonomy?

Literature Review

Based on Vygotsky's (1978) theory of the Zone of Proximal Development (ZPD), scaffolding entails assisting students in accomplishing tasks they cannot finish independently. There are several ways that scaffolding can occur, such as peer, teacher, and expert scaffolding. It can also be mediated by technology, a crucial component of learning environments. Technological advancements have profoundly changed how teachers teach and how students learn, according to Wells et al. (2008). Furthermore, educators across the globe have experienced an implicit pressure to incorporate technology into their lessons, which has caused them to reassess their methods of instruction. Rather than sidestepping this challenge, teachers should use technology in

their lessons, taking advantage of its benefits to meet learning goals. The potential that technology offers to education is boundless and global. As a result, educators are always looking for new and creative ways to use technology in the classroom to give their students more significant learning opportunities (Shadiev et al., 2024). Students may have more significant learning opportunities in technologically enhanced learning environments. Language teachers have incorporated technology into their lessons more and more because new technologies present unique opportunities (Asratie et al., 2023). Teachers hope to use these technologies to give students rich learning experiences and to make their classrooms more stimulating and engaging.

When utilized appropriately, video is one of the technological mediums that makes an excellent teaching tool, and educators worldwide have been using it to enhance their lessons. Although video lectures are not new, they differ from just playing videos in the classroom because technological advancements make it easier for teachers to create, edit, and share them (Han et al., 2023). These days, flipped classrooms use videos as an added technological component. A "flipped classroom" teaching strategy involves bringing take-home assignments like case studies, simulations, and discussions into the classroom and moving traditional lectures outside. Thus, through the teacher's facilitation, active learning is accomplished during class time (See & Conry, 2014). Learners can complete assignments during class time and view online video lessons conveniently. Compared to traditional learning environments, students are more actively involved in learning in applications with prominent interactive content and visuals (Ozdamlı & Tavukcu, 2016). According to Awidi and Paynter (2019), a flipped classroom can improve learning experiences and capture students' attention. The flipped or inverted classroom is one way to use technology, such as videos, to give traditional lectures a fresh viewpoint. Because of its inverted learning process, the flipped classroom, a key component of blended learning, gives students more time to learn before, during, and after class. According to Han et al. (2024), flipped classrooms involve pre-class delivery of input materials, such as lecture videos that are either recorded by the teacher or downloaded from websites, and during class time, students engage in collaborative activities, projects, and discussions.

EFL contexts offer limited opportunities for using English outside of class, unlike ESL environments. Moreover, a significant portion of class time is devoted to teachers explaining concepts ineffectively—usually by lecturing—while students sit silently and pay attention in silence, which results in a lack of interaction (Osman et al., 2014). As opposed to their lower-order thinking skills (e.g., knowledge, comprehension), which were introduced by Anderson and Krathwohl (2001), Lockwood and Folse (2014) claimed that flipped learning could increase learners' higher-order thinking skills (e.g., application, analysis, synthesis, evaluation). Providing scaffolding for EFL learners in technologically enhanced classrooms positively impacts their language proficiency and personality qualities like autonomy.

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Autonomy has been central to discussions for over thirty years in education. Autonomy, which comes from the Greek word auto-nomos, where auto means "self" and nomos means "rule" or "law," describes a situation in which people are in charge of their affairs. While the term originated in political discourse, it has been used in philosophy, medicine, and psychology, among other fields, to refer to the ability of individuals or organizations to rationalize their actions on their own (Benson, 2014). Learner autonomy has long been acknowledged as the ultimate educational goal, especially in teaching foreign or second languages (FL/SL). It is frequently linked to students' active engagement in their educational processes (Benson, 2007), a viewpoint bolstered by multiple studies conducted in various settings (Farivar & Rahimi, 2015). Learner autonomy is viewed conceptually as a "complex" and "multifaceted" construct that has changed dramatically over time (Smith & Ushioda, 2009). Because of this, there are many definitions of autonomy; however, autonomy is still a fundamental aspect of modern language education and is essential to researchers and educators.

Numerous studies have examined the relationship between scaffolding and flipped classrooms. For example, Ahmed (2016) examined how flipped classrooms affected students' English writing proficiency and discovered that it improved students' attitudes and motivation for writing. According to the study, flipped classrooms encourage student motivation and engagement, which improves language learning outcomes. Ekmecki (2017) also showed that the flipped Writing C]class model outperforms traditional lecture-based instruction to enhance students's writing proficiency. The study further validated the advantages of flipped classrooms in language education by suggesting that this model supports independent and collaborative learning, aligning with constructivist principles. The effect of flipped classroom instruction on the English composition writing of Iranian EFL learners was investigated by Abedi et al. (2019). The study demonstrated the model's efficacy in improving writing skills by finding that flipped classroom students outperformed traditional instruction on post-tests. Andujar et al. (2020) conducted a recent study to examine how students perceived flipped learning in EFL classes and their satisfaction with technology. According to the quantitative analysis, students reported high levels of autonomy and overall satisfaction with the flipped learning experience. The study underlined how crucial well-made video content is to the effectiveness of flipped learning on mobile devices.

The flipped classroom approach has significantly increased learner autonomy in various educational contexts, especially when combined with technology. Through a qualitative case study, Xiao et al. (2018) investigated the holistic and intricate nature of boosting college students' autonomy using a flipped classroom approach. They observed classroom dynamics, conducted qualitative interviews with eight teachers, and examined relevant artifacts using sociocultural theory. The result of their research is the TRACK effect model, which shows how instructor scaffolding in a flipped classroom

environment gradually fosters the development of autonomy. Additionally, Ghufron and Nurdianingsih (2019) examined how flipped instruction and computer-assisted language learning (CALL) were used in Indonesian EFL writing classes. This multi-site case study included questionnaires, focus group interviews, lesson plan analyses, and in-class observations from five private universities. The study showed that flipped instruction combined with CALL improved student motivation, learner autonomy, and communication. Qualitative interviews also revealed that students were more involved in self-regulated learning environments and class activities.

In a similar vein, Huang (2020) examined how learner autonomy was affected by flipped teaching in an online EFL reading course. Over a semester, 38 first-year English majors from a Taiwanese university engaged in four flipped reading sessions using a specially created platform. According to the study, students started taking more ownership of their education, showed more independence when participating in class activities, and developed into more self-sufficient decision-makers. Additionally, the students demonstrated a greater willingness to take control of their educational journeys by participating in more extracurricular learning activities. Lastly, Dariyemez (2023) concentrated on using the flipped classroom model to help college students develop their capacity for independent learning. Significant gains were noted in the study's findings for students' motivation for independent learning, self-management skills, and autonomous learning behaviors. This suggests that the flipped classroom model fosters long-term autonomous learning skills and improves immediate classroom engagement. These studies suggest that flipped learning approaches promote increased student independence, responsibility, and engagement, creating a more self-governing learning environment. The data supports that creative instructional designs can significantly affect students' motivation and capacity to direct their learning processes.

Educational interventions aimed at enhancing learners' knowledge and proficiency in English have grown in frequency recently, which is not unusual. According to our understanding, scaffolding flipped classrooms and autonomy have all been extensively studied in various educational contexts, including EFL and ESL. Fortunately, it seemed that there weren't many studies describing how the mobile-mediated flipped scaffolding strategy affected EFL students' perceptions of the mentioned strategy in an EFL context like Iran, in addition to their levels of autonomy and grammatical production in writing classes. Consequently, our research was an effort to close this gap. There are various reasons why this research is essential. First, it fills a vacuum in the literature by investigating the little-studied effect of mobile-mediated flipped scaffolding on the writing autonomy of EFL learners. Secondly, it offers perspectives on how this teaching methodology can improve student performance and engagement in writing, an essential language acquisition ability. Third, the results may help language instructors understand the advantages of using scaffolding techniques

and technology in their lessons, which will ultimately help students become more independent and improve their writing abilities.

Method

Design

This study employed a mixed-methods research design to collect quantitative and qualitative data. Quantitative data was gathered through pre- and post-tests on grammar and autonomy, and qualitative data was gathered through interviews.

Participants

Participants were upper-intermediate English as foreign language students in Tehran, Iran's Ava private language school. The age range of the participants, all of whom were female, was 17 to 24. Every student at the institute was categorized as upper-intermediate level based on their learner profiles. The researchers used a convenience sampling technique to access this particular learner population. There were 58 participants in the sample, 29 placed in the experimental group (EG) and 29 in the control group (CG).

Instruments

A range of data collection tools were used in the study to collect both quantitative and qualitative data. The Oxford Quick Placement exam (OQPT) was used as a proficiency exam to ascertain participants' overall English language competency and ensure a representative sample from the upper-intermediate range. Brown et al. (1998) state that the OQPT is a validated test with established face validity and content. After a pilot test, a pre and post-test were given to participants to gauge their understanding of the target grammatical structures and to identify any potential pre-existing differences. The pre-test and post-test had the same structure and contents to guarantee that the results could be compared. The specific grammatical topics covered in the textbook (Top Notch) were the focus of these tests. These topics included conditional type one, active/passive voice, and using the past simple tense to express habits. Tests comprised of production tasks and fill-in-the-blank exercises covered 45 items totaling the three grammatical rules; there was a 50-minute time limit—alignment between the treatment intervention and the textbook content established content validity. A Cronbach Alpha coefficient for internal consistency and a validity coefficient of.75 were obtained from the pilot testing. The autonomy questionnaire developed by Li et al. (2021, p. 23) was the other instrument used in this study besides the OQPT and grammar pre-and post-tests. The students responded to each of the 21 items on a five-point Likert scale. Five options, from never to always, are available for the first eleven Likert scale items. In

the second section of the questionnaire, which is multiple-choice, participants were asked to select the response that most closely matched their attitudes, beliefs, or ideas. The answers ranged from A (1 point) to E (5 points), with a maximum score of 100. It is important to note that experts confirmed the questionnaire's reliability and validity. The autonomy questionnaire's reliability was reported to be 79. A semi-structured interview was conducted after the intervention to determine how the participants felt the strategy affected their autonomy and grammatical knowledge. The interview data were analyzed using Schmidt's (2004) qualitative data analysis method, as will be detailed in the procedures section.

Procedure

Participants were made aware of the study's objectives and the confidentiality of their answers to ensure ethical research practices. Anonymity was guaranteed to both the participants and the researchers. Even though students had to write their names on the tests when administered, they were not connected to their answers when the data was analyzed. Two weeks before the start of the intervention, 74 upper-intermediate EFL learners took the Oxford Quick Placement Test (OQPT). The objective of this step was to evaluate the language proficiency homogeneity of the learners. 16 students were eliminated from the study because their proficiency test results did not meet the inclusion criteria (scores more significant than one standard deviation above or below the mean).

After the OQPT was administered and participants who did not meet the criteria were excluded, 58 students stayed in the intact classes, and the study continued. Both groups finished the autonomy Questionnaire and a pre-test on grammar production one week before the intervention. The treatment group was exposed to a flipped scaffolding classroom approach through mobile mediation. Flipped classrooms are characterized by instruction primarily outside of class, with application and practice-focused activities taking place inside. Brief, two-minute lecture videos were sent via WhatsApp three days before each class to cover specific grammar points. After watching these videos, the students were supposed to write pieces that used the target grammar structures independently. The WhatsApp platform also promoted communication by letting students exchange pertinent learning resources (documents, audio files, and videos), ask questions, and receive and give peer feedback. The instructor's primary focus during class was on paragraph construction. She helped students at every step of the writing process—planning, drafting, revising, and editing—by using their smartphones as scaffolds.

To assist students in coming up with ideas and gathering data for their compositions, the teacher-led brainstorming sessions during the planning phase. Students used the ideas they had generated during the planning stage to inform the first drafts they wrote during the drafting phase. The instructor went around the groups,

observing the progress of the students and offering assistance when required. The instructor gathered the initial drafts from the students and gave them limited in-class feedback along with handwritten comments during the revision phase. After that, the students edited their drafts despite the teacher's criticism. Students had to closely read their revised drafts during the editing phase, paying particular attention to mechanics and grammar. Final teacher correction, peer correction, and self-correction were all part of this phase. Students completed each topic and then sent in essays for teacher evaluation.

The control group was the traditional scaffolding group. The instructor divided the students into three groups to facilitate peer scaffolding in this group. In these groups, more experienced students—peers—helped their less experienced peers apply particular grammatical rules to their writing. Peer support entailed offering advice and samples to help with difficulties that arose while writing. The instructor also underlined how crucial context is when utilizing new vocabulary. Within a 25-minute time frame, students collaborated in groups to finish a passage and respond to related questions. The instructor kept an eye on group dynamics and offered assistance when required. To help students produce the intended grammatical structures in their writing, this support included teaching them how to recognize text structure and use connective words.

Eight seventy-minute sessions made up the treatment plan, which was created to ensure enough time for memory retention between pre-and post-tests. The same instructor taught both groups, but the treatment group's curriculum, methods of instruction, and approaches were different. After the intervention, data for both groups was gathered. Each group took the same autonomy questionnaire and grammar test. Independent samples t-tests were used to compare the scores between the groups and provide answers to the first two research questions. The third research question was answered by conducting interviews with participants in the treatment group. The audio recordings of the interviews were made to enable precise transcription and comprehensive analysis. The following section contains the findings from the interviews. The following section includes the findings from the interviews. These results investigate how students perceive the benefits and drawbacks of the flipped classroom approach in terms of enhancing their autonomy and grammatical knowledge. Pupils were urged to explain their answers and relate their learning experiences.

We had one-on-one interviews in Farsi with every student. The English translations of their answers were added to the qualitative data used in the study. Many measures were taken to guarantee the accuracy of the interview data. First, three Shahreza Azad University Applied Linguistics professors translated the interview transcripts and checked their accuracy. Second, to ensure consistency in interpretation, 20% of the transcripts were examined by two independent raters (a TEFL professor and a PhD candidate) to establish inter-rater reliability. Lastly, data was collected using a Farsi version of the instruments to increase data credibility. Two coworkers conversing

with the data analysis procedure recorded 20% of the interviews, which added to the reliability.

Data Analysis

The inter-rater reliability coefficient for this procedure was 95. SPSS software (version 22) was used to analyze quantitative data. An independent sample t-test was run on autonomy surveys. Descriptive analysis was then used for surveys on flipped learning in classes. To assess EFL learners' opinions on the flipped learning environment, a theme analysis was performed on the interview questions. A P-value of less than 0.05 was deemed noteworthy.

Results

As mentioned, before the onset of the research, a grammar production pretest was administered to the groups. Furthermore, after the treatment in the form of a mobile-mediate scaffolding strategy in the flipped classroom, a posttest in grammar production was used. The results of the descriptive statistics of the pretest and posttest in grammar are represented in Table 1.

Table 1.

Descriptive Statistics of Pretest and Posttest in Grammar Production

	N	Min	Max	Mean	SD
Control pretest	29	8.50	10.00	10.92	1.61
Experimental pretest	29	9.00	11.00	11.10	1.45
Control posttest	29	13.50	26.00	21.72	1.24
Experimental posttest	29	19.00	39.00	34.86	1.41

Table 1 indicates that the means of the treatment group in the pretest (M=11.10, SD=1.4) and control (M=10.92, SD=1.6) group are somewhat the same. In the posttest, the experimental group's mean score (M = 34.8, SD = 1.5) was more significant than the control group's (M = 21.7, SD = 1.2). However, an independent samples t-test was performed to see if this difference was statistically significant after the treatment. The normality of the data is a crucial t-test presumption. The data can be deemed regularly distributed because the significant values (Sig) in the normality test were more extensive than 0.05. The results of the t-test are presented in Table 2.

Table 2.

Results of Independent Samples T-Test in Grammar Production

	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	1.307	.003	9.21	56	.000	4.166	.42853	3.3088	5.0244
Equal variances not assumed.			9.21	51.4	.000	4.166	.42853	3.3065	5.0267

The independent samples t-test results are shown in Table 2. According to Levene's test for homogeneity of variance, there is a statistically significant difference between the groups (F (1, 56) = 1.307, p =.256). The investigation continues because the t-test is typically resilient to deviations from normalcy. The statistical analysis reveals that the mean scores of the two groups on the grammar production post-test differ, as indicated by the significant t-test statistic (t (56) = 9.21, p <.001). The treatment group fared better than the control group, as shown by the means (treatment group: M = 34.8, control group: M = 21.7). This finding allows us to reject the null hypothesis, which stated that there would be no difference between the groups in their post-test grammar production scores. In other words, the mobile-mediated flipped scaffolding strategy effectively improves EFL learners' grammar production skills (p < .05).

The second null hypothesis intended to test the effectiveness of mobile-mediated flipped scaffolding strategy on the autonomy of EFL learners. To this end, two administrations of the autonomy questionnaire were compared. Table 3 shows the descriptive statistics of the learners on the pretest and posttest of autonomy before and after the main study.

Table 3.

Descriptive Statistics of Pretest and Posttest in Autonomy

Groups	N	Mean	SD

Experimental pretest	29	72.50	9.67
Control pretest	29	71.50	10.32
Experimental posttest	29	82.5	10.7
Control posttest	29	74.00	10.3

Table 3 reveals that the mean score of the experimental group in the autonomy pretest is 72.50, with an SD of 9.67. Also, the mean of the control group is 71.5, with an SD of 10.32. After treatment, the same autonomy test was administered between groups as the post-test. Table 3 reveals that the mean score of the experimental group is 82.5, with an SD of 10.7. Also, the control group's mean is 74.00, with an SD of 10.3. To determine if there was a difference between the two groups, an independent samples t-test was used. The results of an independent sample t-test are shown in Table 4.

Table 4.

Results of Independent Samples T-Test in Autonomy

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2 tailed)	Mean Difference	Std. Error Difference
Pretest-Posttest	Equal variances assumed	4.907	.273	-19.944	56	.000	-6.800	.34095
	Equal variances are not assumed.			-19.944	50.424	.000	-6.800	.34095

The above table represents the results, which revealed that the Sig level is .273 since it is higher than 0.05. Thus, it can be concluded that the scores are different in the pre-and post-test of autonomy; hence, the second null hypothesis that claimed "mobile-mediated flipped scaffolding does not affect Iranian EFL learners' autonomy in writing classes within computer-mediated settings" is rejected. The results indicated the performance of the mobile-mediated flipped scaffolding group over the control group in autonomy scores.

The study's second phase investigated the viewpoints of the treatment group's students, who fared better than the control group regarding grammar creation and self-regulation. The first interview question asked participants about their experiences in the mobile-mediated flipped scaffolding class. All interviewed students (n = 10) commented

favorably on the positive and engaging classroom atmosphere. They suggested that the interactive nature of the classroom setting motivated learners and fostered engagement throughout the class period, potentially due to a reduction in perceived pressure compared to traditional textbook-based instruction. These student reflections collectively indicate that the mobile-mediated flipped scaffolding strategy, incorporating cellphone use, was perceived favorably by young adult EFL learners. The students expressed a preference for novel and engaging instructional tools. All the students loved learning English with the mobile app (flipped scaffolding). They found it way more engaging than traditional methods. The interviewed participants brought up reasons such as the course's comprehensiveness and fascinating nature that made mobile-mediated flipped helpful scaffolding, especially during the Coronavirus pandemic. Another student, Fatima (23 years old), specified her reasons as follows:

The third question of the interview aimed to investigate the participants' attitudes towards finding any part of the class that encouraged them to keep going in their learning, improve their writing, or produce grammatical points in writing courses. According to some students' viewpoints, the interaction between teacher, student, and peers in mobile-mediated flipped scaffolding instruction assisted them in improving their writing. Moreover, speaking with others at the same level improved their writing and motivated her to use the course again. The reason for improving writing was the fun nature of the course. The other question of the interview tried to investigate the interviewees' attitudes about how learning materials were presented for the assigned activities within and outside the classroom.

Some students believed the difficulty connecting to the class and low internet access were the demerits of the mobile-mediated flipped scaffolding class. They believed that outside the class, the application could prevent the students from doing other important things, whereas it would increase the students' level of English inside the class. Other students compared inside and outside the institute and mentioned wasting time and ignoring the critical sections of the lessons or tasks outside the class, even though it is effective for learning writing.

The fifth interview question attempted to investigate the students' attitudes regarding their ability to understand and explain the new content through mobile-mediated flipped scaffolding and explain them. All students except one (90%) reported that they could understand the content. The sixth interview question asked how they found mobile-mediated flipped scaffolding to support and improve writing and the production of grammatical points. The students believed that the new method of instruction was interactive, which pushed them to improve their writing. The last interview question explored the students' ideas about the relationship between the online course they took and their level of autonomy before and after the course. All interviewed students (n = 10) provided insights into how the mobile-mediated flipped scaffolding approach influenced their sense of autonomy in learning English. Their reflections indicated that the course

positively impacted students' ability to self-regulate their learning. Some students' perspectives underscore the importance of the accessibility and flexibility provided by mobile learning tools in promoting self-directed learning.

The responses to the last interview question demonstrate that the mobile-mediated flipped scaffolding approach significantly enhanced students' autonomy in learning English. Before the course, many students relied heavily on teacher guidance and lacked proactive learning habits. However, through the course, they gained confidence in self-directed learning, improved their ability to set and achieve personal learning goals, and developed effective study habits. Mobile technology provides flexibility and accessibility, empowering students to learn at their own pace and according to their schedules. Furthermore, the engaging and interactive nature of the course fostered a sense of responsibility and motivation. The overall impact was a notable increase in students' autonomy, making them more independent and self-regulated learners.

Discussion

This study looked into how well mobile-mediated flipped scaffolding affected the autonomy and grammar production of Iranian EFL students in writing classes. Analyses of quantitative data were carried out to answer the research questions. The results demonstrated the rejection of the null hypothesis regarding grammar production ($p < .05$). The treatment group outperformed the control group on the post-test, indicating that mobile-mediated flipped scaffolding instruction considerably enhanced writing skills among EFL learners. This result is consistent with studies that show learner anxiety can be decreased and subskill performance, such as grammar, can be improved when teacher mediation is used as a scaffolding tool in a mobile learning environment. Scaffolding combined with MALL could produce a nurturing environment for learning that promotes affective and cognitive development (Wang et al., 2023). In addition, the favorable results might have been influenced by the fact that Iranian EFL students were accustomed to using technology and may have relied more on independent study. These results align with earlier research (Hassan Taj et al., 2017) emphasizing the advantages of technology-enhanced learning environments for developing language skills and sub-skills. Learner autonomy and the flexibility to customize the learning pace are two benefits of MALL over traditional methods. By fusing aspects of online and traditional education, blended learning settings enable students to control their education more (Roh & Kim, 2019).

The study's positive results may have been influenced by the flipped classroom concept, which is theoretically consistent with mastery-based, student-centered, self-regulated, and active learning (Zou et al., 2022). These methods all place a strong emphasis on the independence and control that students have over their education. These characteristics are highlighted in several studies found in the reviewed literature (Bicen & Beheshti, 2019; Shyr & Chen, 2018). Research, however, also indicates that individual differences, such as language beliefs, preferred teacher qualities, and personal

circumstances, may impact students' success in flipped classrooms (Hao, 2016). The second research question investigated the impact of mobile-mediated flipped scaffolding on Iranian EFL learners' autonomy in producing grammatical points in writing courses. Like the grammar production results, the null hypothesis for independence was rejected ($p < .05$). The treatment group scored significantly higher than the control group on the autonomy post-test. This implies that mobile-mediated flipped scaffolding education positively impacts learners' autonomous learning abilities.

The qualitative data approved the results of the quantitative data. Based on the interview results, the final research question explored participants' perceptions of the mobile-mediated flipped scaffolding experience. Because of the engaging and interactive environment of the mobile-mediated flipped scaffolding, more than 90% of students who participated in interviews attested to its usefulness. This is especially pertinent in light of the move to online education during the COVID-19 pandemic. Nevertheless, a few students also brought up Iran's poor internet connection as a possible drawback of the mobile-mediated flipped scaffolding strategy.

The results of the interviews consistently showed that the students thought well of the mobile-mediated flipped scaffolding approach. The students valued the engaging and entertaining atmosphere of the classroom. Mobile technology increased student engagement and lessened the strain of traditional textbook-based instruction. Higher motivation and a more upbeat outlook on learning English resulted from this. It was determined that the mobile-mediated approach was beneficial for improving various language skills, such as writing and grammar creation. The mobile platform's attractive features encouraged students to learn more, and its flexibility allowed for self-paced learning. Students' increased autonomy was one of the course's most important effects. Students frequently depended heavily on teacher guidance before the course. However, after finishing the course, they felt more capable of taking charge of their education, establishing objectives, and locating resources independently. This change was made possible by the widespread use of mobile phones, which made educational resources easily accessible and promoted experimentation. Overall, the study finds that the mobile-mediated flipped scaffolding approach significantly improves EFL students' learning experiences by increasing the process's interaction, motivation, and autonomy. Along with helping students become more proficient language learners, the method increased their sense of independence and accountability for their education. Although specific logistical issues exist, the promising results indicate that this approach has much potential to enhance EFL instruction, especially in light of contemporary technological advancements.

These students' opinions about online education are consistent with previous studies. Some research (Dalilan, 2021; Ozudogru & Hısmanoglu, 2016) have examined students' attitudes regarding virtual learning environments and have discovered largely positive views comparable to what the students in this study reported. Furthermore,

studies indicate that students frequently have positive opinions of web-based language instruction (Modhish & Al-Kadi, 2016). The present study's results on achievement improvements in learning outcomes align with previous research, suggesting that flipped learning can enhance student success (Cleary, 2020; Smallhorn, 2017). Moreover, Du's (2020) research demonstrated that the flipped classroom model considerably improved students' self-management abilities. This aligns with the current study's findings, in which Rana highlighted better study strategies and initiative in reviewing course materials. According to both studies, the flipped classroom model increased students' desire to study independently. According to Hala's statement in this study, she felt more motivated and accountable for her education because of how engaging mobile-mediated learning is. The results of this study are consistent with Du's (2020) observation that the flipped classroom model stimulated students' autonomous learning behavior. Pupils like Dalia mentioned feeling more confident learning independently by accepting more significant responsibility in group projects. The findings also support Perks and Warchulski's (2019) study, which discovered that learner autonomy can be increased through flipped classroom techniques and mobile-assisted language learning (MALL). It offers factual data and valuable insights pertinent to the study setting.

Several essential aspects of the mobile-mediated flipped scaffolding approach have contributed to the positive shift in student autonomy before and after the online course. In contrast to conventional classroom settings, the online course offered a dynamic and captivating learning environment. Students found the learning process more engaging and relatable when mobile technology was used, especially teens and young adults who are used to using mobile devices daily. Students were probably inspired to participate more actively in their education due to this enhanced engagement. Because the course was self-paced, students could customize their learning to meet their own needs, which promoted a sense of autonomy. The flipped scaffolding approach, mediated by mobile devices, promoted autonomous exploration and learning among students. The course gave students the tools to become self-directed learners, transferring the burden of learning from the teacher to the student. Lastly, traditional textbook-based instruction frequently uses a one-size-fits-all approach, hindering students' learning. On the other hand, the mobile-mediated flipped scaffolding approach offered a more customized learning environment that catered to various learning preferences and styles. Students were inspired to take charge of their education by this flexibility. To summarize, the course's interactive design, flexibility, encouragement of self-regulation, readily available resources, and supportive peer interactions all contribute to students' positive attitudes toward the online course and the observed increase in their autonomy. Together, these components created an atmosphere that encouraged students to take charge of their education, which increased their independence and encouraged self-directed learning habits.

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Conclusion

The efficacy of mobile-mediated flipped scaffolding on the grammar production and autonomy levels of Iranian EFL learners in writing classes was examined in this study. Analyses of quantitative data were carried out to answer the research questions. The findings showed that the grammar production null hypothesis was rejected ($p < .05$). On the post-test, the treatment group performed better than the control group, suggesting that mobile-mediated flipped scaffolding instruction significantly improves EFL learners' writing abilities. This result indicated that learner anxiety can be decreased and sub-skill performance in grammar can be improved when teacher mediation is used as a scaffolding tool in a mobile learning environment. Integrating scaffolding with MALL may produce a supportive learning environment that promotes cognitive and affective development.

Moreover, favorable results, such as autonomy, might have been influenced by Iranian EFL learners' experience with technology and possible dependence on independent study. Flipped scaffolding mediated by a mobile device can give students greater autonomy over the speed and method of their education. To sum up, to support students' independent learning, it is beneficial to understand the potential of various learning settings and learn how to incorporate new technology in an environment that has been upgraded by technology.

The findings will be helpful to educators and other stakeholders in creating new learning environments and offering MALL support to help students acquire this vital skill and become more independent and responsible for their education. The results of this study have significant ramifications for teaching and learning English to foreigners, especially when it comes to scaffolding in online environments. It implies that a combination of approaches, such as computer-based scaffolding, can improve learning outcomes for EFL students while eschewing conventional teaching techniques.

More research should look into the effectiveness of think-aloud exercises or verbal reports to learn more about the scaffolding process from the viewpoints of teachers and students. It should also look into the stability of results over the years and across various academic subjects. There is also a need for more extensive research on multiple facets of language learning, like reading and listening comprehension, and a comparison of reported difficulties and practices in mixed-method language learning environments. While the study highlights the benefits of mobile-mediated scaffolding, it also has limitations. The participants' previous experience with technology and the specific focus on grammar in writing may not generalize to other skills or broader learner populations. Future research should explore the long-term effects of mobile-mediated scaffolding across different language skills, such as reading and listening comprehension, and in various educational contexts. Additionally, investigating the role of think-aloud exercises or verbal reports could provide deeper insights into the scaffolding process from both teachers' and students' perspectives.

Understanding the potential of mobile-mediated learning environments can help educators design effective, learner-centered strategies that foster autonomy and skill development. Future research should continue to explore technology integration in language education, aiming to improve instructional methods and support students in becoming independent, responsible learners. Future research projects aim to further our comprehension of mediation's function in EFL learning and offer insightful recommendations for improving language education instructional strategies.

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