# The Flipped-based WebQuest Model (FWQ): An Innovative Approach for Teaching Grammar and Alleviating Students' Anxiety

**Shaimaa Mahmoud Ahmed Abdelghafar, Alberto Fernández-Costales & José Luis Belver Domínguez**

University of Oviedo, Spain

**Abstract:** Digital learning tools and web-based approaches have been widely used among educators to cope with learners' needs and demands in the era of the technological revolution, especially after the COVID-19 pandemic. This study investigates how using the FWQ (Flipped-based WebQuest) model and WQ (WebQuest) with EFL preparatory students could influence their grammar proficiency and reduce their anxiety in language learning. The sample comprised 106 English as a Foreign Language (EFL) students in the preparatory stage. They were divided into two experimental groups (FWQ, WQ) and one control group. The first experimental group (n=35) studied through the FWQ model, the second (N=34) used WQ, and the control group (n=37) learned using traditional learning. A pre/post grammar test, a pre/post grammar anxiety scale and an FWQ questionnaire were used to assess the effect of the independent variables on EFL grammar proficiency. A paired sample T-test and ANOVA were run to calculate the improvement. The outcomes revealed that both FWQ and WQ are effective strategies, but the results are significant in the FWQ model due to the combination of Flipped and WebQuest learning.

## Introduction

In recent years, education has experienced significant changes due to the integration of technology and the widespread availability of Internet resources (Lindeiner-Stráský et al., 2020). This digital revolution has paved the way for innovative approaches and strategies in language learning. Web-based learning has emerged as a prominent paradigm in contemporary education. This article aims at investigating the impact of the Flipped-based WebQuest (FWQ) model as an application of web-based and online learning in teaching grammar and reducing students' anxiety.

Web-based instruction has gained great popularity in language teaching, as it provides an avenue for learners to tap into a vast array of resources and opportunities for educational growth. One of the prominent applications of Web-based learning is online learning. Online learning harnesses the power of the Internet to deliver educational content and facilitate interactive learning. It encompasses a wide array of digital learning methods, such as online activities, quizzes, gamification, video lectures, online assignments, and collaborative work. This multifaceted approach offers students numerous opportunities for engagement, discussion, meaningful work, and collaboration (Dos Santos, 2022; Moorhouse, 2023; Xu & Zou, 2023). By integrating online and digital learning tools into the educational process, learners can participate in self-paced learning, receive personalized instruction, and engage in interactive activities. These resources support students in enhancing their understanding and empower their education by providing easy access to educational materials (Maican & Cocoradă, 2021; Tao & Gao, 2022).

WebQuests (WQs) are considered among the most relevant digital tools in web-based language learning, primarily due to their structured environment. WQs are grounded in constructivism and scaffolded learning, where students develop language proficiency by engaging in meaningful activities using authentic materials available on the Internet.

They serve as a well-structured strategy, aiding students in navigating provided resources to search for information, with the goal of accomplishing the assigned task through analytical and critical thinking skills. In this context, students do not passively consume content but rather play a significant and active role in the educational process (Awada et al., 2019; Elgeddawy, 2018; Hadriana & Adanan, 2020).

Flipped learning (FL) is an innovative approach widely utilized in education (Tran et al., 2022; Yulian, 2021). The core concept involves a shift where students are provided with instructional content before class, typically in the form of instructional videos or remotely accessible materials. They then use their class time to actively apply this material through various learning strategies (Thai et al., 2020; Voigt et al., 2020; Yoon et al., 2018; Zou & Xie, 2018). FL is a student-centered approach that offers students tailored learning opportunities. It fosters a flexible environment, enabling students to dedicate more time to practical application, collaborative problem-solving projects, higher-order thinking tasks, the acquisition of new knowledge, and communicative active learning, all under the guidance and facilitation of the teacher. Consequently, the teacher assumes roles as an organizer, guide, facilitator, and manager (Bergmann & Sams, 2013; Hung, 2014, 2016; Lin & Hwang, 2018).

The present study aims to make a significant contribution to the existing research on the utilization of web-based learning and online teaching methods in language acquisition. More specifically, this article will concentrate on comparing the impacts of FWQ and traditional WebQuests (WQs) in terms of their effectiveness in enhancing English grammar proficiency and reducing grammar-related anxiety. By conducting a comprehensive analysis of the efficacy of both approaches, this research endeavor aims to provide valuable insights into the current state of knowledge regarding web-based learning in the context of foreign language education.

## Literature review

**WebQuests**

In 1995, Bernie Dodge, a professor of education at the University of San Diego, introduced a novel strategy to maximize the educational potential of the Internet, which he named WQs. WQs streamline the process of accessing information, allowing learners to focus on its application rather than extensive searching. These tasks not only foster critical thinking skills but also encourage deep and collaborative learning experiences. Moreover, WQs have been shown to significantly boost motivation, ultimately contributing to students' success in the learning process (Dodge, 1995; Ebadi & Rahimi, 2018; Halat, 2008). WQs are an organized and structured strategy based on an inquiry-based activity model. Students have access to a large amount of information through prepared links that support inquiry-based learning, which supports the effective use of the course time (Awada et al., 2020; Dodge, 1995; Ebadi & Rahimi, 2018; Halat, 2008). Consequently, teachers can use Internet resources in classrooms efficiently by organizing some of these resources for students to solve some problems and achieve certain tasks in an effective environment.

WQs can be viewed as scaffolded learning structures that leverage web links to essential resources. These tasks are designed to engage students in authentic assignments, motivating their exploration of a central, open-ended question.

This process encourages the development of individual expertise and culminates in a collaborative group activity aimed at transforming newly acquired information into a more sophisticated understanding (Halat, 2008). Well-designed WebQuests achieve this by inspiring students to discern richer thematic relationships, fostering real-world contributions to the learning process, and prompting reflection on their metacognitive processes (March, 2004). Researchers in the field distinguish between two levels of WQs: short-term and long-term. Short-term WebQuests focus on learners' knowledge acquisition and integration and can typically be completed in one to three class periods. During this time, students grapple with a substantial amount of new information and synthesize it. In contrast, long-term WebQuests emphasize learners' capacity to extend and refine their knowledge. These tasks may span more than three class periods, depending on the scope of the project. In a classroom setting, a student engaging in a long-term WebQuest would deeply analyze a body of knowledge, transform it in a meaningful way, and demonstrate their understanding by elaborating on or synthesizing ideas or creating something that others can engage with, either online or offline (Dodge, 1995). WQs are composed of five stages:

1. Introduction: It provides fundamental details about the lesson.
2. Task: It outlines the specific tasks that learners are required to achieve by the end of the lesson.
3. Resources: These are the materials or links provided to students to assist them in achieving the tasks.
4. Process: This stage provides students with the sequential steps that learners need to follow to complete the assigned tasks.
5. Evaluation: It provides students with the criteria by which students' work will be evaluated.
6. Conclusion: This component offers a concise summary of the lesson.

WQs play a significant role in language learning, offering students an interactive environment based on web-based instructional activities (Awada et al., 2020; Samiei & Ebadi, 2021). Shvaikina (2020) conducted a study to investigate the effectiveness of WQs as an instructive tool in teaching foreign languages at a technical university. The study aimed to enhance learners' attitudes toward science concepts learning, promote student creativity, decision-making, initiative-taking, and engagement. The study included 45 participants from the Faculty of Industrial and Civil Engineering who worked with WQs for over two semesters, and the outcomes confirmed the effectiveness of WQs as a learning strategy.

In another study, Salem (2022) explored the impact of using WQs on improving academic writing and soft skills among language learners while reducing their writing anxiety. The study involved 54 students divided into three groups: the first group studied with WQs, the second group relied on free Google searches, and the third group used offline learning methods. The study employed instruments such as the Second Language Writing Anxiety Inventory (Cheng, 2004), the Soft Skills Rating Card, and the IELTS writing task. Data analysis was conducted using SPSS. The results demonstrated that WQs are an effective and significant tool for developing writing and soft skills while reducing writing anxiety.

Another study by Awada et al. (2020) investigated the impact of integrating the Student Team Achievement Division, a structured cooperative learning method, and WQs on enhancing argumentative writing skills among English as a Foreign Language (EFL) students. This 12-week study involved 78 students, with 54 in the experimental group and 24 in the control group. Data were collected using pre- and post-writing tests and questionnaires, and ANCOVA was employed for data analysis. Interestingly, the main outcome of the study revealed that only students with lower L2 proficiency developed their writing skills in the foreign language.

Gómez-Parra et al. (2018) conducted a study that explored the impact of technological strategies, specifically WQs and MiniQuests (MQs), on the reading comprehension performance of Ecuadorian EFL students. The sample comprised EFL students in Ecuador, and the study focused on how the implementation of these strategies influenced students' reading comprehension abilities. The outcomes of the study showed that both WQs and MQs had comparable impacts on reading comprehension. The study considered the use of MQs over WQs due to their shorter duration, which enhanced the desired outcomes with students

**Flipped Learning**

FL is a form of blended learning where students engage with online materials before class and then participate in hands-on activities during in-person sessions (Bergmann & Sams, 2012). A fundamental aspect of FL is the transition that occurs when students access instructional videos or online resources remotely, which they study before class to apply during their in-person sessions (Chang, 2023; Li et al., 2022; Zhao & Yang, 2023).
FL offers students the opportunity to learn at their own pace and provides a variety of in-class activities that support active learning strategies, including peer interaction, active learning, and cooperative learning (Hwang et al., 2023; Liu et al., 2023; Zhou et al., 2023). This instructional approach fosters flexibility and student engagement, offering a diverse learning experience that extends beyond traditional classroom methods (Divjak et al., 2022; Senali et al., 2022; Tambunan et al., 2022).

In FL, students assume responsibility for their learning by making choices, sharing ideas, and monitoring their progress through collaborative and communicative active learning (Lin & Hwang, 2018). Teachers provide resources, support, or guidance when needed, facilitating self-directed learning and enabling students to be active participants in their educational journey (Galindo-Dominguez, 2021).

Several research studies have explored the implementation of FL in diverse educational contexts. Phoeun and Sengsri (2021) examined the impact of a flipped classroom with communicative language teaching (CLT) on communicative speaking skills in an undergraduate English class at the Royal University of Phnom Penh. The study involved 21 freshmen enrolled in 2017-2018, and a mixed-method approach was employed. The findings demonstrated that combining a flipped instruction model with CLT activities effectively improved speaking skills and enhanced learning outcomes.

Fernández-Carballo et al. (2022) investigated the effect of FL on the attitudes of university students using ICT. The study comprised 40 university students and employed both quantitative and qualitative data collection methods. The results indicated that students preferred FL over traditional teaching methods.

Sengul and Bensen (2021) explored EFL students' attitudes toward in-class and out-of-class writing models within a flipped classroom setting. The study included 30 EFL students from the English language teaching department of a private university and utilized a quantitative research design. The findings revealed that students exhibited positive attitudes toward both in-class and out-of-class writing models in the flipped classroom, with a preference for the out-of-class model.

Soltanabadi et al. (2021) conducted a study involving 48 female learners aged 13 to 17 to investigate the impact of the flipped classroom approach on Iranian adolescent elementary students' vocabulary recall and retention. The participants were divided into an experimental group (n=24) and a control group (n=24). A quasi-experimental research design was employed, utilizing various instruments, including English language placement tests, vocabulary pretests, immediate post-tests, and delayed tests. ANCOVA analysis revealed significant positive effects of the flipped classroom on vocabulary recall and retention.

**FWQ model**

The FWQ strategy integrates two learning strategies, specifically WQs and FL, into a comprehensive framework. This model has three distinct stages: The first and final stages occur outside the classroom at home, while the second stage is conducted during class time. The first stage includes the first three elements of WQs, namely the introduction, which offers the aims of the lesson, and the task, which outlines the requirements of the assignment and process and information resources, which present internet resources. Before the class session, students also collaborate to prepare for the upcoming task that will be presented in class and out of class. The second stage takes place within the classroom, including the other components of WQs. Additionally, an "Activities" element is incorporated to engage students in various class activities. An evaluation stage enables students to receive feedback from both their teacher and peers. The conclusion stage provides students with a summary of the lesson. The final stage involves an assignment component that encourages students to deepen their understanding and knowledge, and it occurs after the completion of the class session see Figure 1.

**Figure 1**

*FWQ model*
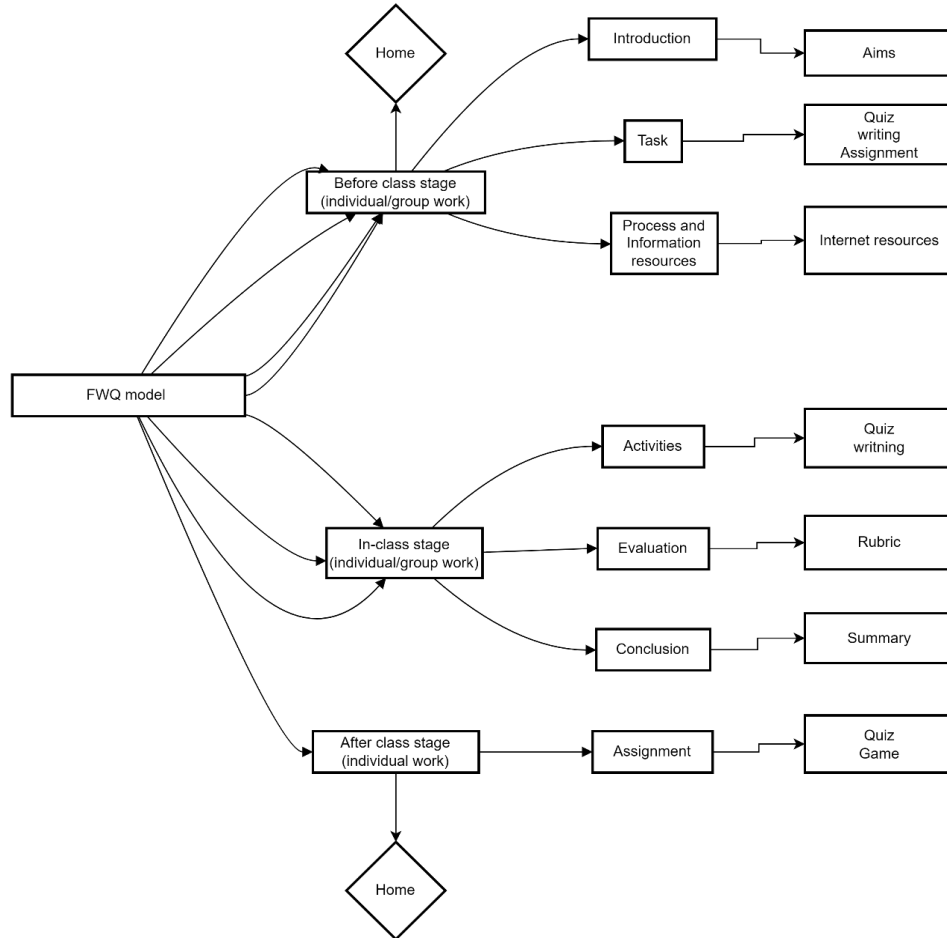


**Foreign language anxiety**

Foreign Language Anxiety, commonly referred to as FLA, is a psychological phenomenon that affects many individuals learning English as a second or foreign language. It is characterized by feelings of stress, nervousness, and fear associated with the use of English in social or academic settings (Liu & Yuan, 2021; Uştuk & Aydın, 2016). FLA is defined as a distinct complex of self-perceptions, beliefs, feelings, and behaviors related to classroom language learning arising from the uniqueness of the language learning process (Horwitz et al., 1986).

According to Horwitz et al. (1986), there are three primary types of FLA: Test anxiety, communication apprehension, and fear of negative evaluation. Test anxiety arises from the stress related to grade expectations. It can be inferred that situational anxiety, categorized as FLA, arises due to the difficulty of creating favorable social impressions and communication challenges that result in the fear of failure on foreign language tests (Aydin, 2008). Communication anxiety occurs when students experience tension and anxiety while engaging with others (Aydin, 2016). Learners'

perception of themselves as skilled communicators is undermined by communication anxiety, which could result in additional anxiety and fear. Fear of negative evaluation stems from students' beliefs that they are unable to make a favorable social impression and are more likely to dread criticism, leading to reduced participation in activities. Consequently, FLA often leads to negative emotional responses in learners.

Grammar anxiety is a phenomenon commonly observed among English language learners, characterized by apprehension and stress related to the rules and complexities of English grammar (Ekinci & Taşdemir, 2022). Students experience anxiety when faced with the challenging task of producing grammatically correct sentences or engaging in conversations that require precise usage. Various factors contribute to this anxiety, including the fear of making mistakes and perceived judgment from peers, classmates, or teachers (Karçiç & Çetin, 2017).

Grammar anxiety can be a significant obstacle in language acquisition and overall communication skills. It may reduce self-confidence and limit students' participation in both oral and written activities, ultimately affecting their learning experience and outcomes (Dewaele et al., 2022). Instructors can help students alleviate grammar anxiety and create a more confident and enjoyable learning environment by implementing effective strategies.

## Materials and Methods

### Research Design

The present study followed a quantitative method, utilizing pre- and post-grammar tests with a questionnaire to collect data about students' L2 grammar skills. A quasi-experimental design was adopted to answer the following research questions:

1. To what extent does grammar proficiency improve in the FWQ group?
2. How effectively do grammar skills enhance in the WQs group?
3. Are there statistically significant differences in grammar proficiency levels among the FWQ, WQs, and Traditional Learning (TL) groups?
4. To what extent does grammar anxiety decrease in the FWQ group?
5. How effectively does grammar anxiety reduce in the WQs group?
6. Are there statistically significant differences in grammar anxiety levels among the FWQ, WQs, and TL?
7. What are students' attitudes towards the FWQ model?

### Participants

The study consisted of 106 students enrolled in a preparatory stage in Assuit Governorate, Egypt. They were divided into three distinct groups: The first experimental group (n=35) learned using FWQ; the second experimental group (n=34) learned using WQ; and the control group (n=37) group received traditional face-to-face teaching (or traditional learning –TL–).

**Experiment**

106 students participated in the experiment. Learners had similar L2 proficiency based on the results of the English exam conducted by the Directorate of Education, Asuit, Egypt. The grammar test was run twice at the beginning of the experiment and the end of the experiment. It was comprised of 20 questions that included multiple-choice, complete, read and correct, and reordering words.

Two Google sites were established for the FWQ and WQ models, and both approaches were used to train the two experimental groups. The FWQ model was divided into three phases: Before, during, and after class. To have a good understanding of the lesson, students in the first experimental group received their learning through the FWQ model and followed the introduction, task, and information resources before class time. Students learned about the lesson objectives in the beginning. Then, learners understand what the required tasks are before the conclusion of the course, and they have the freedom to contact each other before class time and collaborate to find answers and solutions to the required work. Students should use the available links to gain a thorough understanding of the subject.

During class, students participate in class activities. The first task is to answer a quiz, and the second is to collaborate to write some sentences regarding the topic they have learned. The evaluation and conclusion follow. Then, students received feedback from their teachers and peers on the evaluation rubric. As a conclusion, students had a summary of what they had learned in this lesson. After the class, there was an assignment that students did at home individually to deepen their understanding of the topic.

In the second experiment, the lessons were done in class. Learners followed the five components of WQs. They were provided with information about the lesson objectives. Students were then divided into groups to collaboratively work on the activities during class. After that, they followed a structured process, referred to information resources, received evaluation through a rubric, and concluded the lesson with a summary of their learnings. While the control group received the traditional way through book texts. The study continued for one term, see Figure 2.

**Figure 2**

*Pre- and post-grammar test / grammar anxiety scale*
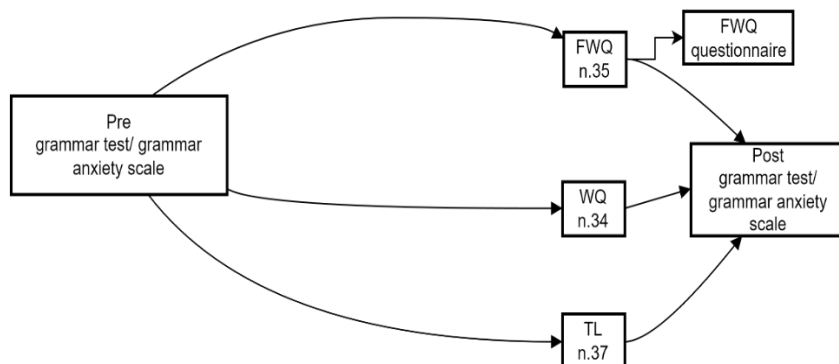
**Instruments**

FWQ and WQ sites provided students with the resources. A pre-post grammar test was run at the beginning and end of the experiment for the control and experimental groups. A grammar anxiety scale (Ekinci & Taşdemir, 2022) was used before and after the treatment. ANOVA analysis was used to examine the effect of FWQ and WQ on students' English grammar and anxiety and compare means of scores between the control and experimental groups using SPSS. Additionally, the FWQ questionnaire was administered after the treatment with the first group to assess student attitudes towards the use of FWQ.

## Results

A Kolmogorov-Smirnov test was run to check the normality of the data. The results of the experimental and control groups in the pre-test were .200, .200, and .200 respectively, while the listening post-tests were 200 .200 and .102, thus assuring the normality of data, as shown in Table 1.

**Table 1**

*The one-sample Kolmogorov-Smirnov test for normality of data*

|  | Group | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
|  |  | Statistic | df | Sig. |
| Pre-test | Exp1 | .098 | 35 | .200 |
|  | Exp 2 | .087 | 34 | .200 |
|  | Con | .086 | 37 | .200 |
| Post-test | Exp 1 | .106 | 35 | .200 |
|  | Exp 2 | . 101 | 34 | .200 |
|  | Con | . 132 | 37 | .102 |

Pre-test results were analysed to check the distribution of the three groups. As shown in Table 2, the mean score of the first experimental group (M=9.60– SD 4.067) was higher than the first experimental group (M=8.91– SD 4.159) and the control group (M=9.08; SD 3.759). This difference was not significant (p>0.05), since the p-value was .756, as shown in Table 3. Thus, the three groups were almost equivalent.

To answer the first research question (To what extent does grammar proficiency improve in the FWQ group?), a paired sample t-test was conducted, to determine the differences between the mean scores of pre-tests and post-tests in the experimental group. The results, presented in Table 3, indicated a noteworthy difference between the pretest (M = 9.60, SD = 4.067) and post-test (M = 14.94, SD = 3.741) scores of the students. This significant difference was observed as a consequence of implementing the FWQ model. The analysis revealed a substantial change from the students' pretest scores to their post-test scores (df = 34; t = 19.888; p < 0.000).

**Table 2**

*The Descriptive statistics of the three groups in the grammar pre-tests*

|  | N | Mean | Std. Deviation | F | Sig. |
|---|---|---|---|---|---|
| 1 | 35 | 9.60 | 4.067 | 0.281 | 0.756 |
| 2 | 34 | 8.91 | 4.159 | | |
| 3 | 37 | 9.08 | 3.759 | | |
| Total | 106 | 9.20 | 3.965 | | |

**Table 3**

*Paired Samples Statistics*

|  | N | Mean | Std. Deviation | T | Df | Sig. |
|---|---|---|---|---|---|---|
| Post-g-G1 | 35 | 14.94 | 3.741 | 19.888 | 34 | .000 |
| Pre-g-G1 | 35 | 9.60 | 4.067 | | | |

To answer the second question (How effectively do grammar skills improve in the WQ group?), a paired sample t-test was conducted to determine the differences between the mean scores of pre-tests and post-tests in the experimental group. The results, presented in Table 4, indicated a noteworthy difference between the pretest (M = 8.91, SD = 4.159) and post-test (M = 12.53, SD = 4.069) scores of the students. This significant difference was observed because of implementing the FWQ model. The analysis revealed a substantial change from the students' pretest scores to their post-test scores (df = 33; t = 15.907; p < 0.000).

To answer the third question (Are there statistically significant differences in grammar proficiency levels among the FWQ, WQ, and TL groups?), independent sampled one-way ANOVA was run. The descriptive statistics showed that the mean scores of the first and second experimental groups were 14.94 and 12.53, respectively, and the mean scores of the control group were 10.16, F 13.474, P< .000, as shown in Table 5. Therefore, it can be concluded that the two experimental groups performed better than the control group.

**Table 4**

*Paired Samples Statistics*

|  | N | Mean | Std. Deviation | T | Df | Sig. |
|---|---|---|---|---|---|---|
| Post-g-G2 | 34 | 12.53 | 4.069 | 15.907 | 33 | .000 |
| Pre-g-G2 | 34 | 8.91 | 4.159 |  |  |  |

**Table 5**

*The descriptive and interferential statistics of the three groups in the grammar post-tests*

|  | N | Mean | Std. Deviation | F | Sig. |
|---|---|---|---|---|---|
| 1 | 35 | 14.94 | 3.741 | 13.474 | 0.000 |
| 2 | 34 | 12.53 | 4.069 |  |  |
| 3 | 37 | 10.16 | 3.905 |  |  |
| Total | 106 | 12.50 | 4.345 |  |  |

The results of the Scheffe test compare the scores of the three groups and confirm that there are significant differences between the post-test of the three groups in favour of the experimental groups, as shown in Table 6.

**Table 6**

*Post-hoc Scheffe Test, multiple comparisons (post-test multiple comparisons)*

| (I) groups | (J) groups | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| 1 | 2 | 2.413* | .941 | .041 | .08 | 4.75 |
|  | 3 | 4.781* | .921 | .000 | 2.49 | 7.07 |
| 2 | 1 | -2.413* | .941 | .041 | -4.75 | -.08 |
|  | 3 | 2.367* | .928 | .043 | .06 | 4.67 |
| 3 | 1 | -4.781* | .921 | .000 | -7.07 | -2.49 |
|  | 2 | -2.367* | .928 | .043 | -4.67 | -.06 |

*. The mean difference is significant at the 0.05 level.

Therefore, The FWQ outperformed the WQ, and the TL group as shown from the pre/post results in the grammar test, see Figure 3.

**Figure 3**

*Pre/post-grammar results*
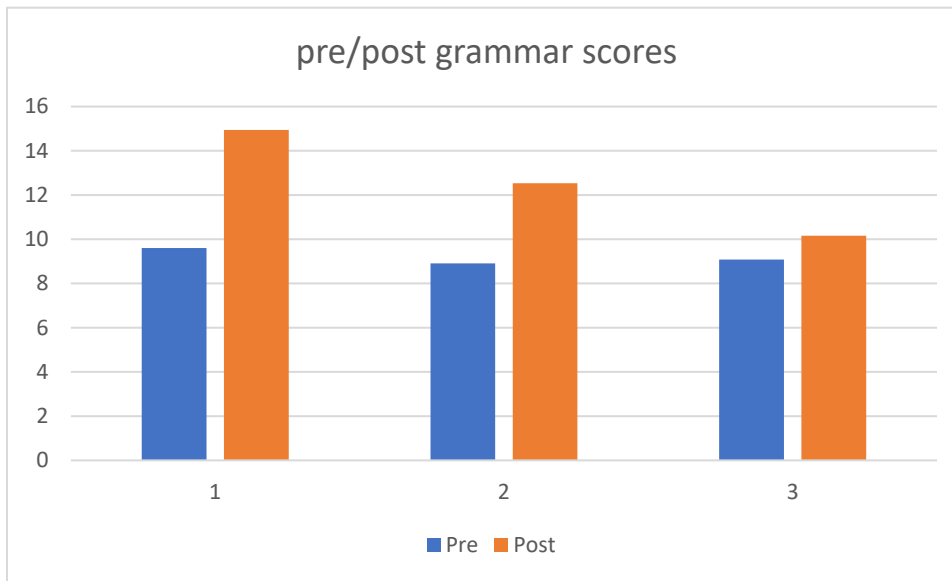


To answer the fourth question (To what extent does grammar anxiety decrease in the FWQ group?), a paired sample t-test was conducted to determine the differences between the mean scores of pre-tests and post-tests in the experimental group. The results, presented in Table 7, indicated a noteworthy difference between the pretest (M = 110.14, SD = 8.200) and post-test (M = 78.97, SD = 9.316) scores of the students. This significant difference was observed because of implementing the FWQ model. The analysis revealed a substantial change from the students' pretest scores to their post-test scores (df = 34; t = 20.660; p < 0.000).

**Table 7**

*Paired Samples Statistics*

| | N | Mean | Std. Deviation | T | Df Sig. |
|---|---|---|---|---|---|
| pre_anxiety_G1 | 35 | 110.14 | 8.200 | 20.660 | 33 .000 |
| post_anxiety_G1 | 35 | 78.97 | 9.316 | | |

To answer the fifth question (How effectively does grammar anxiety reduce in the WQ group?), a paired sample t-test was conducted to determine the differences between the mean scores of pre-tests and post-tests in the experimental group. The results presented in Table 8, indicated a noteworthy difference between the pretest (M = 110.88, SD = 11.200) and post-test (M = 91.85, SD = 8.832) scores of the students. This significant difference was observed because of implementing the FWQ model. The analysis revealed a substantial change from the students' pretest scores to their post-test scores (df = 33; t = 18.124; p < 0.000).

*Table 8*

*Paired sample statics*

|  | N | Mean | Std. Deviation | T | Df Sig. |
|---|---|---|---|---|---|
| pre_anxiety_G2 | 35 | 110.88 | 8.200 | 18.124 | 33 .000 |
| post_anxiety_G2 | 35 | 91.85 | 9.316 |  |  |

To answer the sixth question (Are there statistically significant differences in grammar anxiety levels among the FWQ, WQ and TL groups?), independent sampled one-way ANOVA was run. The descriptive statistics showed that the mean scores of the first and second experimental groups were 78.97 and 91.85, respectively, and the mean scores of the control group were 104.51, 11, F 75.092, P .000, as shown in Table 9. Therefore, it can be concluded that the two experimental groups performed better than the control group.

**Table 9**

*Descriptive statistics of the three groups in post grammar anxiety scale*

|  | N | Mean | Std. Deviation | F | Sig. |
|---|---|---|---|---|---|
| 1 | 35 | 78.97 | 9.316 | 75.092 | .000 |
| 2 | 34 | 91.85 | 8.832 |  |  |
| 3 | 37 | 104.51 | 8.372 |  |  |
| Total | 106 | 92.02 | 13.727 |  |  |

According to the outcomes of the Scheffe test, a comparison of the scores of the three groups reveals that there are significant differences favouring the experimental groups in their post-test performance. as shown in Table 10.

To answer the seventh question (Which are students' attitudes towards the FWQ model?), mean values and standard deviations were used (see Table 11).

Based on the data shown in Table 11, n.7 FWQ prepared me well for in-class sessions and got the highest mean score (M=4.57). This may be because of the availability of resources before class sessions, therefore, students can rewatch videos or review anything they missed as many times as they want, helping them understand well as presented in n.2, students show a high average of agreement (M=4.37) on the effective role of FWQ in supporting their understanding. This outcome goes in line with the study by Chen and Hwang (2020) which reported that students are provided with pre-recorded instructional materials to review outside of class, allowing them to familiarize themselves with the

content at their own pace. This pre-learning phase sets the stage for in-class activities where students actively engage with the material through discussions, group work, and hands-on exercises. Whereas n.3 FWQ is enjoyable got the second highest mean score (M=4.43). It means that the majority of students strongly agree with this statement. This may be due to the interactive environment of the FWQ model that offers an engaging learning experience for students. This result is consistent with Bārdule (2021), Hsia et al. (2021) and Hwang et al. (2023), who reported that the interactive environment of the flipped classroom transforms the traditional learning experience into an active journey through watching videos and engaging in different authentic tasks.

**Table 10**

*Post-hoc Scheffe Test, multiple comparisons (post-test)*

| (I) groups | (J) groups | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval Lower Bound | Upper Bound |
|---|---|---|---|---|---|---|
| 1 | 2 | -12.882* | 2.129 | .000 | -18.17 | -7.59 |
|  | 3 | -25.542* | 2.084 | .000 | -30.72 | -20.37 |
| 2 | 1 | 12.882* | 2.129 | .000 | 7.59 | 18.17 |
|  | 3 | -12.661* | 2.100 | .000 | -17.88 | -7.44 |
| 3 | 1 | 25.542* | 2.084 | .000 | 20.37 | 30.72 |
|  | 2 | 12.661* | 2.100 | .000 | 7.44 | 17.88 |

*. The mean difference is significant at the 0.05 level.

Thus, the FWQ achieved a significant change in the anxiety level more than the other two groups, see Figure 4.
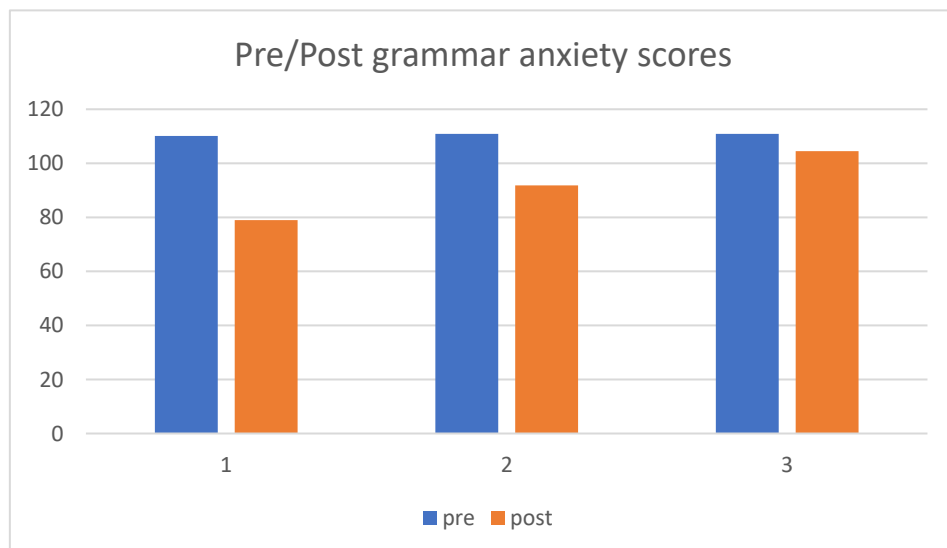
**Figure 4**

*Pre/post grammar anxiety scores*

**Table 11**

*Descriptive statistics of students' attitudes towards using the FWQ model*

| | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| 1- FWQ is easy to use | 35 | 2 | 5 | 3.97 | .785 |
| 2- FWQ helps me understand well | 35 | 3 | 5 | 4.37 | .598 |
| 3- FWQ is enjoyable | 35 | 3 | 5 | 4.43 | .698 |
| 4. FWQ is difficult | 35 | 3 | 5 | 4.11 | .718 |
| 5- FWQ increases my collaboration with my peers | 35 | 3 | 5 | 4.09 | .781 |
| 6. FWQ helps me develop my evaluation skills | 35 | 3 | 5 | 4.03 | .785 |
| 7- FWQ prepared me well for in-class sessions | 35 | 4 | 5 | 4.57 | .502 |
| 8- FWQ helps me feel more confident | 35 | 3 | 5 | 3.94 | .838 |
| 9- FWQ is boring | 35 | 3 | 5 | 4.14 | .772 |
| 10- Overall, I am satisfied with FWQ learning | 35 | 3 | 5 | 4.23 | .731 |
| Valid N (listwise) | 35 | | | | |
| Total | | | | 4.18 | .438 |

Many students agree that FWQ helped them to improve their evaluation skills through the evaluation rubric and the feedback they receive, and it is clear from the mean scores of students (M=4.03) in n.6. This goes in line with Thai et al. (2020) who refer to the significant role of feedback in developing students´ evaluation skills. Also, many students showed a high average score (M=4.09) indicating their agreement on the significant role of FWQ in supporting collaborative learning. This is consistent with Awada et al. (2020) and Li and Li (2022) who state that FL offers great cooperative learning opportunities through engaging in collaborative activities. Additionally, students found that FWQ was easy to use because of its well-structured design. Al Asadi (2020) and Kozlovskii et al. (2021) refer that the well-structured design of WebQuest helps students to get knowledge easily without missing a vast amount of information on the internet. with a mean score of (M= 4.11), students expressed their agreement that FWQ boosts their confidence. According to some studies (Singay, 2020; Zakaria & Yunus, 2020), flipped classroom plays a significant role in enhancing students' confidence. Moreover, the outcomes reveal a general sense of satisfaction regarding the use of FWQ with mean scores (M=4.23). Generally, Table 12 showed that the general mean score of the students´ responses was 4.18, with a standard deviation of,438. This means that there is a generally positive attitude towards the use of the FWQ model, see Figure 5.

**Figure 5**

*Students' attitudes towards using the FWQ model*
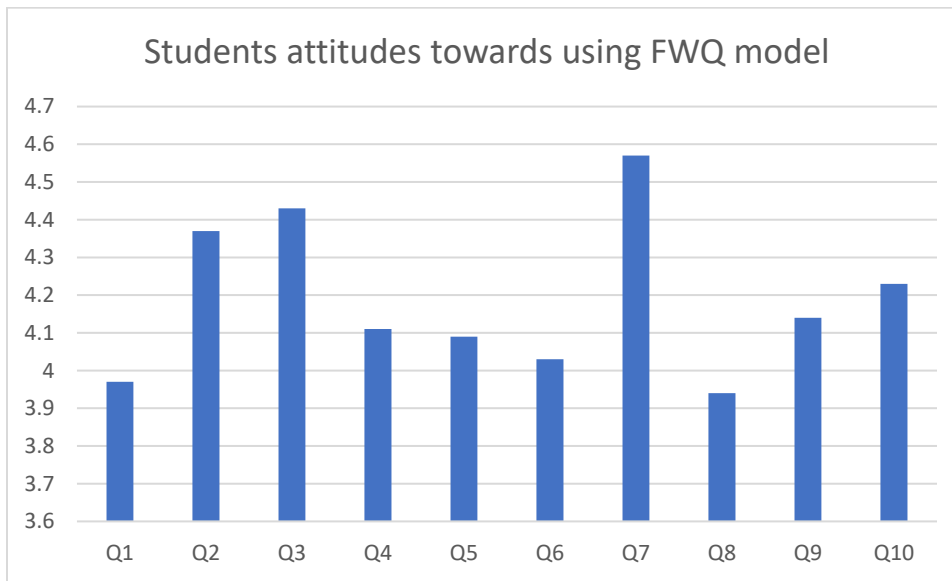


**Discussion**

The outcomes of the paired sample T-test and ANOVA revealed that both FWQ and TWQ have a significant effect on students' improvement in grammar. Likewise, both models helped to reduce learners' grammar anxiety. However, participants who studied through FWQ outperformed those who studied using WQs and TL in improving their grammar level and decreasing their anxiety. Additionally, there is a generally positive attitude towards the use of the FWQ model.

The study's findings underscore the significance of pre-class educational resources as a vital component of web-based learning. These resources not only improve students' grammar proficiency but also enhance their autonomy and promote student-centered learning. These outcomes are consistent with previous research conducted by Ebadi and Rahimi (2018), which demonstrated significant improvements in students' English language proficiency and levels of responsibility when using the WebQuest-based flipped classroom compared to traditional methods. This success can be attributed to the interactive and meaningful resources that result from the combination of flipped and WebQuest strategies in language acquisition. Additionally, the findings align with Abdelghafar et al. (2022), who confirmed that web-based learning effectively enhances English writing skills while reducing English anxiety. This is achieved through the combination of flipped learning and WebQuests, which provide students with an interactive and structured learning environment that accommodates their individual pace of learning.

In addition, students' engagement in pre-class interactions and collaborative discussion contributed to developing English language acquisition which helped students to be well prepared for the in-class activities through engaging in meaningful communication, fostering a deeper understanding of vocabulary and grammatical structures by

participating in discussion and exchanging ideas with peers. Thus, engagement in pre-class interactions and collaborative discussions plays a crucial role in the continuous development and improvement of students' English language acquisition. These empirical findings are in line with Almansour and Kurt (2022), who asserted that student-group interaction enhances students´ comprehension and motivation, creating a positive attitude towards the learning process.

Besides, according to Awada et al. (2020), collaborative activities in class session plays a significant role in enhancing and supporting English language proficiency Since these activities encourage active participation and interaction among students, allowing them to construct knowledge and develop a deeper understanding of the subject matter. By engaging in collaborative tasks, students have the opportunity to engage in discussion, exchange ideas, share perspectives, and develop a sense of ownership towards their learning and the collective learning objectives of the group. Consequently, collaborative activities in class develop students' level of language learning and enhance their interpersonal skills as well.

In a similar vein, the feedback that students receive from their teacher and classmates through the evaluation rubric in the context of FL and WQs holds significant importance in their grammar level. The evaluation rubric provides students with clear criteria for their performance, offering a structured framework for their required tasks, and helping students to enhance their understanding, thinking, and application of knowledge. This agrees with Prilipko (2018) and Bārdule (2021) who assured the importance of feedback in developing student language learning. Consequently, receiving feedback is a significant component in the process of language learning as it is a guide for students to their current and future performance.

Moreover, the examination of the results reveals a notable decrease in grammar anxiety as a result of the blended implantation of FL and WQs. This decrease can be attributed to the interactive learning environment facilitated by these strategies, as they offer opportunities for students to have great opportunities before class time to learn according to their peace. This observation aligns with the findings highlighted by Gok et al. (2021) and Chen and Hwang (2020), who underscore the significant role of the flipped classroom approach in decreasing students' anxiety related to foreign language instruction and reading.

Furthermore, the outcomes showed that there is a general positive attitude towards the use of the FWQ model in English grammar. This attitude can be due to the interactive nature of the FWQ model in teaching language. This finding is consistent with Chou et al. (2021) and Fernández-Carballo (2022), who state the effective role of FL in enhancing students' attitudes towards the learning process since the students who experienced the flipped classroom reported a great sense of ownership over their learning, which positively influenced their attitudes and motivation.

## Conclusions

This study has contributed to the existing body of research on web-based learning and the impact of ICTs in language teaching by examining the pedagogical potential of using FL and WQs. Specifically, a new model—the FWQ—was proposed and compared with WQs and traditional learning. The study's design incorporated two strategies—FL and WQs—to enhance EFL students' grammar proficiency and decrease their anxiety. SPSS was employed for data analysis, utilizing paired sample T-tests and ANOVA to assess the impact on the three groups (FWQ, WQ, and TL). Mean and standard deviation were used to evaluate students' attitudes towards the use of FWQ.

The findings emphasize the significant role of web-based learning and ICTs, particularly in improving and enhancing EFL students' language learning. The results demonstrate significant differences in grammar proficiency improvement and the reduction of grammar anxiety, with the FWQ approach showing superiority. FWQ provides students with easy access to resources before class, allowing for repeated video viewing and facilitating the learning process, thereby enhancing grammar proficiency. Pre-class interaction and communication also played a pivotal role in supporting language learning by encouraging idea exchange, motivation for class tasks, and peer engagement. Additionally, the structured design of FWQ clarified the steps required to complete tasks. Furthermore, the interactive class environment contributed significantly to grammar improvement and anxiety reduction, fostering English language skill development. Post-class assignments offered further practice opportunities, contributing to grammar enhancement and language skill cultivation. As a result, students developed positive attitudes towards FWQ due to its numerous merits. This study can guide educators and curriculum designers in the integration of technological tools and diverse pedagogical approaches to promote English language skill development.

Despite the effectiveness of FL and WQs strategies in improving grammar proficiency, several limitations were identified, including students' lack of technological skills. To address this, students received three training sessions to enhance their technological proficiency. A printed copy of instructional resources was also provided to overcome potential technical issues, such as poor internet connectivity. Furthermore, students' unfamiliarity with FWQ and TWQ necessitated two preparatory sessions to provide essential information before implementing the experiment.

While this study focused on EFL students in preparatory education, future research could investigate the effects of FWQ on enhancing speaking, reading, and writing skills, as well as reducing anxiety related to other aspects of foreign language learning. These findings have significant implications, suggesting that the FWQ model holds promise for alleviating foreign language and grammar proficiency challenges. Moreover, providing students with suitable strategies can make valuable contributions to their educational experiences. The integration of FL and WQs strategies, which combine student-centered learning with technology-enhanced practices, has the potential to open new avenues of research in the field of foreign language learning.

# References

Abdelghafar, S. M. A., Belver Domínguez, J. L., & Fernández-Costales, A. (2022). A flipped-based webquest model as an alternative proposal for students of English as a foreign language in the Covid-19 era. *The International Journal of Technologies in Learning*, *29*(2), 87–100. https://doi.org/10.18848/2327-0144/CGP/v29i02/87-100

Al Asadi, S. S. (2020). Webquest: Iraqi students at Al Furat Al-Awsat Technical University as a case. *Arab World English Journal (AWEJ)*, *6*, 378–392. https://doi.org/DOI:10.24093/awej/call6.25

Almansour, E., & Kurt, M. (2022). Critical thinking for writing using Facebook under Covid-19 lockdown: A course model for English literature students. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/FPSYG.2022.903452

Awada, G., Burston, J., & Ghannage, R. (2019). Webquest on EFL students' argumentative writing skills and their instructors' perceptions. *Computer Assisted Language Learning*, *33*(3), 275–300. https://doi.org/Doi 10.1080/09588221.2018.1558254

Awada, G., Burston, J., & Ghannage, R. (2020). Effect of student team achievement division through webquest on EFL students' argumentative writing skills and their instructors' perceptions. *Computer Assisted Language Learning*, *33*(3), 275–300. https://doi.org/10.1080/09588221.2018.1558254

Aydin, S. (2008). An investigation on the language anxiety and fear of negative evaluation among Turkish EFL learners. *Asian EFL Journal*, *April*, 421–444.

Aydin, S. (2016). Webquests as language-learning tools. *Computer Assisted Language Learning*, *29*(4), 765–778. https://doi.org/10.1080/09588221.2015.1061019

Bārdule, K. (2021). Applying flipped learning approach in EFL classroom in Liepaja Centre Primary School. *Society. Integration. Education. Proceedings of the International Scientific Conference*, *2*, 72–83. https://doi.org/10.17770/SIE2021VOL2.6461

Bergmann, J., & Sams, A. (2012). Flip your classroom reach every student in every class every day. *International Society for Technology in Education*. https://www.rcboe.org/cms/lib/ga01903614/centricity/domain/15451/flip_your_classroom.pdf

Bergmann, J., & Sams, A. (2013). Flip your students' learning. *Educational Leadership*, *70*(6), 16–20. https://www.ascd.org/el/articles/flip-your-students-learning

Chang, D. Y.-S. (2023). Flipping EFL low-proficiency students' learning: An empirical study. *Language Teaching Research*, 1–22. https://doi.org/10.1177/13621688231165474

Chen, M. R. A., & Hwang, G. J. (2020). Effects of a concept mapping-based flipped learning approach on EFL students' English speaking performance, critical thinking awareness and speaking anxiety. *British Journal of Educational Technology*, *51*(3), 817–834. https://doi.org/10.1111/bjet.12887

Cheng, Y. S. (2004). A measure of second language writing anxiety: Scale development and preliminary validation. *Journal of Second Language Writing*, *13*(4), 313–335. https://doi.org/10.1016/j.jslw.2004.07.001

Chou, C. P., Chen, K. W., & Hung, C. J. (2021). A study on flipped learning concerning learning motivation and learning attitude in language learning. *Frontiers in Psychology*, *12*(September), 1–5. https://doi.org/10.3389/fpsyg.2021.753463

Dewaele, J.-M., Botes, E., & Greiff, S. (2022). Sources and effects of foreign language enjoyment, anxiety, and boredom: A structural equation modelling approach. *Studies in Second Language Acquisition*, 1–19. https://doi.org/10.1017/s0272263122000328

Divjak, B., Rienties, B., Iniesto, F., Vondra, P., & Žižak, M. (2022). Flipped classrooms in higher education during the Covid-19 pandemic: Findings and future research recommendations. *International Journal of Educational Technology in Higher Education*, *19*(1), 1–24. https://doi.org/10.1186/S41239-021-00316-4

Dodge, B. (1995). *Some thoughts about webquests*. http://webquest.sdsu.edu/about_webquests.html

Dos Santos, L. M. (2022). Online learning after the Covid-19 pandemic: Learners' motivations. *Frontiers in Education*, *7*(879091), 1–13. https://doi.org/10.3389/FEDUC.2022.879091

Ebadi, S., & Rahimi, M. (2018). An exploration into the impact of webquest-based classroom on EFL learners' critical thinking and academic writing skills: A mixed-methods study. *Computer Assisted Language Learning*, 1–35. https://doi.org/10.1080/09588221.2018.1449757

Ekinci Çelikpazu, E., & Taşdemir, F. (2022). Grammar anxiety scale: The validity and reliability study. *Participatory Educational Research*, *9*(4), 343–366. https://doi.org/10.17275/per.22.94.9.4

Elgeddawy, M. (2018). University students' attitude towards webquest: An empirical correlational study. *IJASOS-International E-Journal of Advances in Social Sciences*, *4*(10), 207–215. https://doi.org/10.18769/IJASOS.425351

Fernández-Carballo, M. V. (2022). Influence of flipped learning on attitudes towards a foreign language subject. *Innoeduca. International Journal of Technology and Educational Innovation*, *8*(1), 44–58. https://doi.org/10.24310/INNOEDUCA.2022.V8I1.11942

Galindo-Dominguez, H. (2021). Flipped classroom in the educational system: Trend or effective pedagogical model compared to other methodologies? *Educational Technology & Society*, *24*(3), 44–60.

Gok, D., Bozoglan, H., & Bozoglan, B. (2021). Effects of online flipped classroom on foreign language classroom anxiety and reading anxiety. *Computer Assisted Language Learning*, *0*(0), 1–21. https://doi.org/10.1080/09588221.2021.1950191

Hadriana, A., & Adanan, M. (2020). M-webquest development: Reading comprehension of senior high school students in Indonesia. *International Journal of Emerging Technologies in Learning*, *15*(3), 74–92. https://doi.org/10.3991/IJET.V15I03.10628

Halat, E. (2008). A good teaching technique: Webquests. *The Clearing House: A Journal of Educational Strategies, Issues and Ideas*, *81*(3), 109–112. https://doi.org/10.3200/TCHS.81.3.109-112

Horwitz, E. K., Horwitz, M. B., & Cope, J. (1986). Foreign language classroom anxiety. *The Modern Language Journal*, *70*(2), 125–132. https://doi.org/10.1111/j.1540-4781.1986.tb05256.x

Hsia, L. H., Lin, Y. N., & Hwang, G. J. (2021). A creative problem solving-based flipped learning strategy for promoting students' performing creativity, skills and tendencies of creative thinking and collaboration. *British Journal of Educational Technology*, 1–17. https://doi.org/10.1111/bjet.13073

Hung, H. T. (2014). Flipping the classroom for English language learners to foster active learning. *Computer Assisted Language Learning*, *28*(1), 81–96. https://doi.org/10.1080/09588221.2014.967701

Hung, H. T. (2016). Clickers in the flipped classroom: Bring your own device (BYOD) to promote student learning. *Interactive Learning Environments*, 1–13. https://doi.org/10.1080/10494820.2016.1240090

Hwang, G. H., Chen, B., & Chen, S.-P. (2023). Impacts of digital game-based flipped teaching approach on learning effectiveness of the students with different prior knowledge levels. *Interactive Learning Environments*, 1–18. https://doi.org/10.1080/10494820.2023.2211630

Hwang, W.-Y., Nurtantyana, R., & Hariyanti, U. (2023). Collaboration and interaction with smart mechanisms in flipped classrooms. *Data Technologies and Applications*. https://doi.org/10.1108/DTA-04-2022-0171

Karçiç, A., & Çetin, M. (2017). On the anxiety factor of speaking skill development among Bosnian learners. Turkish Studies. *Turkish Studies*, *10*(11), 971–986. https://doi.org/http://dx.doi.org/10.7827/TurkishStudies.8496

Kozlovskii, P., Tabolina, A., Kunina, O., Fokina, V., Yudina, I., & Sataev, P. (2021). Polytech webquest as an organization form of students project activities. *Advances in Intelligent Systems and Computing*, *1328*, 431–438. https://doi.org/10.1007/978-3-030-68198-2_40

Li, S., He, J., Tao, Y., & Liu, X. (2022). The effects of flipped classroom approach in EFL teaching: Can we strategically use the flipped method to acquire communicative competence? *Language Teaching Research*, 136216882210815. https://doi.org/10.1177/13621688221081575

Li, Z., & Li, J. (2022). Using the flipped classroom to promote learner engagement for the sustainable development of language skills: A mixed-methods study. *Sustainability (Switzerland)*, *14*(5983). https://doi.org/10.3390/su14105983

Lin, C. J., & Hwang, G. J. (2018). A learning analytics approach to investigating factors affecting EFL students' oral performance in a flipped classroom. *Educational Technology and Society*, *21*(2), 205–219. http://www.jstor.org/stable/26388398

Lindeiner-Stráský, K. von, Stickler, U., & Winchester, S. (2020). Flipping the flipped. The concept of flipped learning in an online teaching environment. *Open Learning*, *37*(4), 1–17. https://doi.org/10.1080/02680513.2020.1769584

Liu, F., Wang, X., & Izadpanah, S. (2023). The comparison of the efficiency of the lecture method and flipped classroom instruction method on EFL students' academic passion and responsibility. *SAGE Open*, *13*(2). https://doi.org/10.1177/21582440231174355

Liu, M., & Yuan, R. (2021). Changes in and effects of foreign language classroom anxiety and listening anxiety on Chinese undergraduate students' English proficiency in the Covid-19 context. *Frontiers in Psychology*, *12*(670824). https://doi.org/10.3389/FPSYG.2021.670824

Maican, M. A., & Cocoradă, E. (2021). Online foreign language learning in higher education and its correlates during the Covid-19 pandemic. *Sustainability (Switzerland)*, *13*(2), 1–21. https://doi.org/10.3390/su13020781

March, T. (2004). *What webquests are (really)*. https://tommarch.com/writings/what-webquests-are/

Moorhouse, B. L. (2023). Teachers' digital technology use after a period of online teaching. *ELT Journal*, 1–13. https://doi.org/10.1093/ELT/CCAC050

Parra, M., Morales, C., & Encalada, E. (2018). The effects of using technological strategies, webquest and miniquest on reading comprehension performance of EFL Ecuadorian students. *2018 Fifth International Conference on EDemocracy & E Government (ICEDEG)*, 322–327. https://doi.org/10.1109/ICEDEG.2018.8372328

Phoeun, M., & Sengsri, S. (2021). The effect of a flipped classroom with communicative language teaching approach on undergraduate students' English speaking ability. *International Journal of Instruction*, *14*(3), 1025–1042. https://doi.org/10.29333/iji.2021.14360a

Prilipko, E. (2018). Giving immediate feedback on students' writing: another view on a flipped classroom. *11th Annual International Conference of Education, Research and Innovation (ICERI)*, 6502–6509.

Salem, A. (2022). The impact of webquest-based sheltered instruction on improving academic writing skills, soft skills, and minimizing writing anxiety. *Frontiers in Education*, *7*(799513), 1–18. https://doi.org/10.3389/feduc.2022.799513

Samiei, F., & Ebadi, S. (2021). Exploring EFL learners' inferential reading comprehension skills through a flipped classroom. *Research and Practice in Technology Enhanced Learning*, *16*(12), 1–18. https://doi.org/10.1186/S41039-021-00157-9

Senali, M. G., Iranmanesh, M., Ghobakhloo, M., Gengatharen, D., Tseng, M. L., & Nilsashi, M. (2022). Flipped classroom in business and entrepreneurship education: A systematic review and future research agenda. *International Journal of Management Education*, *20*(1). https://doi.org/10.1016/J.IJME.2022.100614

Sengul, F., & Bensen Bostanci, H. (2021). In-class versus out-of-class flipped classroom models in English as a foreign language writing. *Propósitos y Representaciones*, *9*(1). https://doi.org/10.20511/pyr2021.v9nspe1.852

Shvaikina, N. S. (2020). Webquest technology in teaching foreign languages in a technical university. *VI International Forum on Teacher Education*, *6th International Forum on Teacher Education (IFTE)*, 2367–2374. https://doi.org/10.3897/ap.2.e2367

Singay, S. (2020). Flipped learning in English as a second language classroom: Bhutanese students' perceptions and attitudes of flipped learning approach in learning grammar. *Indonesian Journal of Applied Linguistics*, *9*(3), 666–674. https://doi.org/10.17509/IJAL.V9I3.23217

Soltanabadi, M. I., Izadpanah, S., & Namaziandost, E. (2021). The effect of flipped classroom on Iranian adolescents: elementary EFL learners' vocabulary recall and retention. *Education Research International*, *2021*. https://doi.org/10.1155/2021/3798033

Tambunan, H., Silitonga, M., & Sinaga, N. (2022). Parents involvement in elementary schools learning through flipped classrooms in Indonesia. *Education 3-13*. https://doi.org/10.1080/03004279.2022.2028877

Tao, J., & Gao, X. (2022). Teaching and learning languages online: Challenges and responses. *System*, *107*, 1–9. https://doi.org/10.1016/J.SYSTEM.2022.102819

Thai, N. T. T., De Wever, B., & Valcke, M. (2020). Feedback: An important key in the online environment of a flipped classroom setting. *Interactive Learning Environments Latest Articles*, 1–14. https://doi.org/10.1080/10494820.2020.1815218

Tran, H., Bui, H., & Kaur, A. (2022). A flipped classroom to personalize learning for engineering students. *International Journal of Learning Technology*, *17*(2), 1. https://doi.org/10.1504/IJLT.2022.10047362

Uştuk, Ö., & Aydın, S. (2016). The effects of the use of paralinguistic cues on foreign language anxiety among English as a foreign language speakers. *Innovation in Language Learning and Teaching*, 1–14. https://doi.org/10.1080/17501229.2016.1211133

Voigt, M., Fredriksen, H., & Rasmussen, C. (2020). Leveraging the design heuristics of realistic mathematics education and culturally responsive pedagogy to create a richer flipped classroom calculus curriculum. *ZDM - Mathematics Education*, *52*(5), 1051–1062. https://doi.org/10.1007/S11858-019-01124-X

Xu, Y., & Zou, Y. (2023). Covid-19 online teaching intervention and learning performance of college foreign language students. *Frontiers in Psychology*, *13*, 1109032. https://doi.org/10.3389/FPSYG.2022.1109032

Yoon, S., Kim, S., & Kang, M. (2018). Predictive power of grit, professor support for autonomy and learning engagement on perceived achievement within the context of a flipped classroom: *SAGE*, *21*(3), 1–15. https://doi.org/10.1177/1469787418762463

Yulian, R. (2021). The flipped classroom: improving critical thinking for critical reading of EFL learners in higher education. *Studies in English Language and Education*, *8*(2), 508–522. https://doi.org/DOI: 10.24815/siele.v8i2.18366

Zakaria, S., & Yunus, M. M. (2020). Flipped classroom in improving ESL primary students' tenses learning. *International Journal of English Language and Literature Studies*, *9*(3), 151–160. https://doi.org/10.18488/journal.23.2020.93.151.160

Zhao, X., & Yang, Y. (2023). Impact of social media-supported flipped classroom on English as a foreign language learners' writing performance and anxiety. *Frontiers in Psychology*, *13*(January), 1–12. https://doi.org/10.3389/fpsyg.2022.1052737

Zhou, X., Chen, S., Ohno, S., She, J., & Kameda, H. (2023). Motivational design for enhancing behavioral engagement in a flipped Chinese course. *Asia Pacific Education Review*, 1–15. https://doi.org/10.1007/s12564-023-09849-x

Zou, D., & Xie, H. (2018). Flipping an English writing class with technology-enhanced just-in-time teaching and peer instruction. *Interactive Learning Environments*, *27*(1), 1–16.

**Corresponding Author Contact Information:**

**Author name**: Alberto Fernández-Costales

**Department**: Education Sciences

**University, Country**: University of Oviedo, Spain

**Email**: fernandezcalberto@uniovi.es

**Conflict of Interest:** None

**Publisher's Note**: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

**Data Availability Statement**: Data from this research was original and gathered by the first author. All data are available.

**Ethics Statement:** The current research has been conducted taking into account all ethical standards.

**Author Contributions** Shaimaa Mohamed: Idea, research design, collection of data, literature review, analysis of results, discussion; Alberto Fernández-Costales: research design, literature review, discussion of results, manuscript review; José Luis Belver: research design, analysis of results, discussion of results, manuscript review.