
Mitigating Foreign Language Speaking Anxiety: The Impact of a Self-Hosted AI Voice Chatbot in the Libyan EFL Context

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ARTICLE INFORMATION

RECEIVED: 06/04/2026

ACCEPTED: 13/04/2026

PUBLISHED: 15/04/2026

Abstract

This study is grounded in Krashen's Affective Filter Hypothesis, and it investigates how interactive and AI environments mitigate Foreign Language Speaking Anxiety (FLSA). While prior research has extensively explored commercial AI platforms, a critical empirical gap exists regarding researcher-developed self-hosted AI chatbots in high-anxiety EFL contexts. This study addresses this gap by analyzing the pedagogical impact of a localized AI tool at one University. A quasi-experimental design was adopted with a sample of $N = 45$ EFL learners (experimental group $n = 25$; control group $n = 20$). The intervention employed a self-hosted AI voice chatbot based on GPT-4o-realtime-preview API. It is designed as an oral production environment, while the control group received traditional classroom instruction. Data were collected using the Foreign Language Speaking Anxiety Scale, and they were analyzed using independent-samples t-tests. The results revealed a significant reduction in anxiety levels for the experimental group ($p < .001$), with a large effect size (Cohen's $d = 1.48$). Post-test scores for the experimental group decreased significantly ($M = 2.61$, $SD = 0.38$) compared to the control group ($M = 3.28$, $SD = 0.41$), $t(43) = 7.89$. The participants demonstrated enhanced linguistic confidence and a 30–38% reduction in avoidance behaviors, suggesting an increased willingness to communicate in peer and classroom interactions. These findings indicate that localized AI-driven conversational agents provide a "psychological safety net" that fosters risk-taking and learner autonomy. This study offers empirical evidence that adapted AI tools as viable pedagogical instruments for overcoming psychological barriers in restrictive EFL settings.

Keywords: AI-assisted language learning, EFL learners, Foreign Language Speaking Anxiety, Libya, voice chatbot, Affective Filter Hypothesis

1. Introduction

The integration of artificial intelligence (AI) into educational frameworks has fundamentally reshaped language learning paradigms. In English as a Foreign Language (EFL) contexts, AI-assisted tools—specifically conversational agents and voice-based chatbots—have introduced unprecedented opportunities for interactive, personalized, and autonomous learning (Huang, Spector, & Yang, 2021; Zawacki-Richter et al., 2022). These technologies empower learners to engage in real-time communication, receive instantaneous feedback, and participate in linguistic practice beyond the logistical constraints of the traditional classroom.

Despite these technological affordances, many EFL learners continue to encounter entrenched psychological barriers that inhibit active oral participation. FLSA, characterized by fear, nervousness, and cognitive apprehension during target language use, remains a pervasive inhibitor of communicative competence (Liu, 2021; Teimouri, Goetze, & Plonsky, 2022). In Libyan EFL settings, high-anxiety environments are often exacerbated by large class sizes, teacher-centered methodologies, and a lack of low-stakes opportunities for oral production. Consequently, many learners adopt avoidance strategies to circumvent the perceived risk of negative evaluation.

Grounded in Krashen's Affective Filter Hypothesis, this study posits that the mitigation of psychological barriers is a fundamental prerequisite for successful language acquisition. As motivation and self-confidence are primary determinants of task engagement (Dörnyei & Al-Hoorie, 2022), technology-mediated environments—particularly those facilitated by AI—can effectively lower the affective filter. AI-based systems offer private, non-judgmental ecosystems that allow for iterative practice at an individualized pace, thereby cultivating linguistic confidence (Dizon, 2022; Fryer & Nakao, 2021).

While the existing literature has extensively evaluated AI's role in enhancing fluency and learner autonomy (Chen et al., 2023; Huang et al., 2022), the majority of this research is situated within technologically advanced or resource-rich contexts. Empirical evidence regarding localized, self-hosted AI interventions in the Libyan EFL context remains sparse (Dizon & Gayed, 2021). Furthermore, while commercial AI platforms have been widely studied, there is a distinct lack of data concerning the efficacy of researcher-developed tools specifically engineered for high-anxiety environments. This gap is particularly acute in Libya, where AI integration in higher education remains in its nascent stages (Hmouma & Benarose, 2026).

To address this empirical deficit, the present study evaluates a self-hosted AI voice chatbot—powered by a low-latency, voice-to-voice large language model (LLM) architecture—to determine its impact on the speaking anxiety and self-perceived confidence of Libyan university students. Utilizing a quasi-experimental design, this research compares AI-mediated practice with traditional instructional methods, analyzing both psychological shifts and behavioral outcomes to provide a robust understanding of customized AI's pedagogical potential.

Accordingly, this study addresses three research questions:

1. To what extent does a self-hosted AI voice chatbot mitigate Foreign Language Speaking Anxiety (FLSA) among Libyan EFL students?
2. What is the impact of asynchronous, AI-mediated oral practice on learners' self-perceived linguistic confidence?
3. How does the reduction of anxiety, facilitated by AI interaction, influence students' behavioral participation in target language speaking activities?

The conceptual framework for this study (see Figure 1) hypothesizes a sequential relationship: interaction with a non-judgmental AI voice agent lowers the learner's affective filter. This reduction in psychological inhibition subsequently cultivates linguistic self-efficacy and fosters increased behavioral participation in target language speaking tasks.

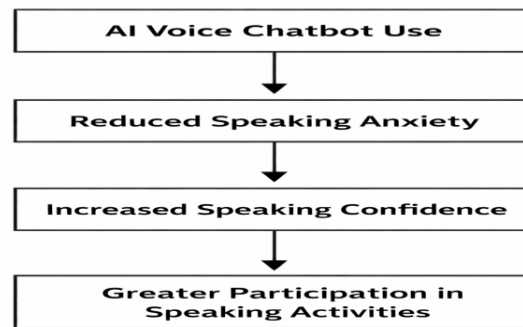


Figure 1. Conceptual framework of the study

2. Literature Review

2.1 Foreign Language Speaking Anxiety in EFL Contexts

Foreign Language Speaking Anxiety (FLSA) inhibits language acquisition by demanding real-time cognitive processing for speech production alongside fear of negative evaluation from peers and teachers (Sadighi & Dastpak, 2017). FLSA negatively impacts Willingness to Communicate (WTC) (MacIntyre & Gardner, 1994), lower classroom participation (Horwitz et al., 1986), and overall oral performance (Sadighi & Dastpak, 2017). The etiological factors of this anxiety are multifaceted, encompassing fear of negative evaluation, lexical and syntactic limitations, and apprehension regarding peer judgment (Liu, 2021; Teimouri et al., 2022). As a multidimensional construct, FLSA is shaped by an intricate interplay of cognitive, emotional, and environmental factors (Alkarkhi & Hmouma, 2025).

Anxiety typically maintains an inverse relationship with motivation and self-efficacy: learners possessing high self-confidence engage more proactively with the target language, whereas highly anxious learners often adopt avoidance behaviors to mitigate psychological discomfort (Dörnyei & Al-Hoorie, 2022). Traditional teacher-centered classrooms frequently fail to provide the "psychological safety" necessary for risk-taking, prompting a pedagogical shift toward technology-mediated environments. However, empirical evidence concerning the application of voice-based AI agents within authentic, high-anxiety classroom contexts remains remarkably limited.

2.2 AI Chatbots and Oral Production Practice

Conversational chatbots simulate dialogue via text or voice, offering responsive ecosystems for linguistic rehearsal. To date, text-based studies dominate the research landscape, leaving a significant gap in the evaluation of voice-based chatbots' impact on socio-affective variables such as anxiety and self-efficacy (Dizon, 2022; Fryer & Nakao, 2021). AI-mediated environments can positively influence affective states by providing low-stakes, private domains for practice, with features such as adaptive learning and personalized, non-threatening feedback enhancing motivation and self-efficacy (Huang et al., 2022).

Despite these advancements, much of the existing literature emphasizes the technological capabilities of AI over the lived psychological experiences of learners. Findings remain mixed: while some studies report significant improvements in linguistic proficiency and engagement, others highlight limitations such as the absence of authentic human interaction and a potential overreliance on automated feedback (Chen et al., 2023). Furthermore, voice-based AI, which most closely mirrors naturalistic communication, remains underexplored despite its high relevance to the mitigation of speaking anxiety. The pedagogical effectiveness of these tools depends heavily on instructional design, highlighting the urgent need for

empirical studies conducted within real-world classrooms, particularly in developing contexts where traditional barriers to speaking are more pronounced.

2.3 The Research Gap

A synthesis of the current literature reveals four primary empirical gaps that this study aims to address:

1. **Skewed Focus on Linguistic Outputs:** Existing research prioritizes proficiency gains, while learners' affective and psychological experiences remain under-evaluated.
2. **Mode Differentiation:** Text-based chatbots dominate the literature; the impact of real-time, voice-to-voice communication on anxiety reduction is significantly underexplored.
3. **Fragmented Variable Analysis:** Psychological constructs—such as anxiety, confidence, and WTC—are frequently studied in isolation rather than as a sequential, interlinked process.
4. **Contextual Homogeneity:** The majority of Computer-Assisted Language Learning (CALL) research is situated in resource-rich nations, limiting the generalizability of findings to developing or restrictive EFL contexts such as Libya.

To address these limitations, the present study employs a quasi-experimental design to examine the impact of a self-hosted AI voice chatbot on the speaking anxiety and self-confidence of Libyan EFL students, evaluating behavioral and psychological outcomes in a holistic manner.

3. Methodology

3.1 Research Design

This study utilized a quasi-experimental, pre-test/post-test non-equivalent groups design. This design was necessitated by the use of intact university classes, which rendered true random assignment impractical. The research aimed to evaluate the causal impact of a self-hosted AI voice chatbot (the independent variable) on FLSA and linguistic confidence (the dependent variables).

3.2 Participants and Sampling

The target population comprised undergraduate students within the English Department at the College of Languages, one University. Through purposive sampling, $N = 45$ participants were recruited and divided into two intact groups:

- **Experimental Group ($n = 25$):** Fifth-semester students who integrated the AI chatbot into their oral production curriculum.
- **Control Group ($n = 20$):** Third-semester students who received conventional, teacher-led classroom instruction.

Although the groups differed in academic level, baseline equivalence in FLSAS scores was statistically confirmed (see Table 1).

The sample size was deemed sufficient for detecting medium-to-large effect sizes in quasi-experimental EFL research (Plonsky & Oswald, 2020). To establish baseline comparability, an independent-samples *t*-test was conducted on pre-intervention FLSAS scores. As shown in Table 1, no statistically significant difference was found between the groups ($p = 0.83$), suggesting equivalent baseline anxiety levels despite differences in academic seniority.

Table 1. *Baseline Comparability of FLSAS Scores (Pre-test)*

Group	N	M	SD
Control	20	3.45	0.42
Experimental	25	3.42	0.45

Note. $t(43) = 0.21, p = .83$.

3.3 Instrumentation and Materials

The primary data collection instrument was a structured questionnaire adapted from the Foreign Language Classroom Anxiety Scale (FLSAS) (Horwitz et al., 1986). The scale was specifically modified to focus on oral production and self-perceived confidence, utilizing a 5-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). Reliability was confirmed via a pilot study, yielding a Cronbach's $\alpha = 0.90$, indicating excellent internal consistency. Content validity was established through expert review by three senior EFL instructors.

The intervention featured a self-hosted AI voice chatbot powered by the GPT-4o-realtime-preview API. This architecture was selected for its low-latency, naturalistic voice-to-voice communication capabilities. Unlike generic commercial platforms, this tool was localized for the pedagogical constraints of the Libyan EFL context, providing a private, asynchronous environment designed to minimize learner inhibition.

3.4 Procedures and Intervention

The study protocol was formally approved by the Institutional Review Board (IRB) and the Dean of the College of Languages at one University. All participants provided written informed consent, and data were treated with strict confidentiality. The eight-week intervention followed a progressive pedagogical syllabus as detailed in Table 2.

Table 2. 8-week AI-mediated pedagogical syllabus

Phase	Weeks	Task Type	Key Topics
I	1–2	Controlled Practice	Self-introductions, daily routines, basic sentence structures
II	3–5	Semi-structured Dialogue	Describing local landmarks, discussing academic challenges
III	6–8	Unstructured	Debating the role of technology, future career

Phase	Weeks	Task Type	Key Topics
		Communication	aspirations

The research was conducted in three phases:

1. **Pre-Intervention Phase:** Both groups completed the FLSAS to establish baseline anxiety and confidence levels.
2. **Experimental Phase:** The experimental group engaged in the AI-mediated tasks (Table 2), while the control group received standard, textbook-based instruction with no access to the AI voice chatbot.
3. **Post-Intervention Phase:** Both groups completed the FLSAS again to measure psychological and behavioral shifts.

3.5 Data Analysis

Quantitative data were processed using SPSS Version 28.0. Descriptive statistics (M, SD) were used to summarize response distributions. Inferential analyses included paired-samples t-tests for intra-group changes and independent-samples t-tests for inter-group comparisons. Cohen's d was calculated to determine the effect size and practical significance of the intervention.

4. Results

4.1 Quantitative Analysis of Speaking Anxiety (RQ1)

To address Research Question 1 (RQ1), post-test FLSAS scores were compared between the experimental and control groups. Table 3 presents the frequency of high-anxiety responses (aggregated "Often" and "Always") for key questionnaire items.

Table 3. Selected FLSAS Items: Comparative Frequency of High-Anxiety Responses (Post-Test)

Item	Description	Control (n = 20)	Experimental (n = 25)
1	Nervous speaking in front of others	50%	20%
3	Fear of making mistakes	50%	24%
6	Losing words while speaking	40%	16%
10	Discomfort in speaking activities	35%	16%

Item	Description	Control (n = 20)	Experimental (n = 25)
19	Fear of negative evaluation/judgment	50%	16%
22	Avoidance of asking questions	70%	40%
23	Avoidance of peer interaction	70%	32%

To evaluate the statistical significance of these differences, an independent-samples t-test was conducted on total FLSAS scores between both groups at post-test.

Table 4: Descriptive Statistics and t-Test Analysis for Total FLSAS Scores

Group	Pre-test M (SD)	Post-test M (SD)	t	p	Cohen's d
Control (n = 20)	3.45 (0.42)	3.28 (0.41)	1.23	0.23	0.34
Experimental (n = 25)	3.42 (0.45)	2.61 (0.38)	7.89	< .001	1.48

The independent-samples t-test revealed a statistically significant reduction in post-test anxiety for the experimental group compared to the control group, $t(43) = 7.89$, $p < .001$, with a large effect size (Cohen's $d = 1.48$). This confirms that the AI intervention successfully mitigated FLSA.

4.2 Behavioral Participation and Willingness to Communicate (RQ2)

Behavioral indicators tracked via the FLSAS revealed a marked decrease in avoidance strategies for the experimental cohort:

- Avoidance of asking questions (Item 22) decreased from 70% to 40% in the experimental group, while the control group remained relatively stable (70% to 65%).
- Avoidance of peer interaction (Item 23) decreased from 70% to 32% for the experimental students, compared to a negligible shift from 70% to 68% in the control group.

A paired-samples t-test for the experimental group confirmed a significant longitudinal improvement in Willingness to Communicate (WTC) behaviors, $t(24) = 5.32$, $p < .001$, Cohen's $d = 1.06$, marking a large practical effect size.

4.3 Perceived Linguistic Confidence and Self-Efficacy (RQ3)

Following the AI-mediated intervention, participants reported reduced cognitive-linguistic blocks. Descriptive responses highlight a favorable shift in confidence.

Table 5: Self-Perceived Confidence Indicators (Post-Test)

Item	Description	Control (Post)	Experimental (Post)
6	Losing words while speaking	40%	16%
11	Confidence in speaking spontaneously	30%	68%
14	Self-efficacy in oral tasks	35%	72%

A paired-samples t-test for the experimental group indicated significant gains in self-perceived confidence, $t(24) = 6.21$, $p < .001$, Cohen's $d = 1.24$. The AI-mediated interaction reduced affective barriers, enabling students to deploy linguistic resources more efficiently and strengthening their self-efficacy beliefs.

4.4 Synthesis of Findings

In summary, the localized AI voice chatbot effectively facilitated a substantial reduction in FLSAS scores, decreasing from $M = 3.42$ to $M = 2.61$ with a large effect size of $d = 1.48$. Simultaneously, the intervention catalyzed proactive communication by reducing avoidance behaviors by 30% to 38% and significantly elevating self-perceived linguistic confidence ($d = 1.24$). These outcomes provide empirical validation for Krashen's Affective Filter Hypothesis, demonstrating that interactive, non-judgmental AI interfaces can successfully lower psychological barriers to oral production.

5. Discussion

The primary objective of this study was to evaluate the efficacy of a self-hosted AI voice chatbot in mitigating FLSA and enhancing linguistic confidence among Libyan EFL university students. The findings indicate that participants in the experimental group experienced a statistically significant reduction in anxiety and a concomitant increase in communicative participation compared to the control group. These results provide robust empirical support for integrating localized AI tools as a viable mechanism to dismantle psychological barriers in high-anxiety EFL contexts.

5.1 Theoretical Implications: Lowering the Affective Filter

The observed reduction in speaking anxiety strongly aligns with Krashen's (1982) Affective Filter Hypothesis. By providing an asynchronous, private, and non-judgmental interaction space, the AI chatbot effectively lowered learners' affective filters. In traditional classrooms, the fear of peer evaluation—which affected 50% of the control group, compared to only 16% of the experimental group (Item 19)—frequently inhibits oral production. In contrast, the AI-mediated environment offered a critical "psychological safety net." This aligns with Fryer and Nakao (2021), who argue that digital agents mitigate the social pressures inherent in human-to-human interaction.

Crucially, this study extends existing theoretical premises by demonstrating that voice-based AI—which demands spontaneous phonological and lexical processing—can achieve affective filter reduction without

the high-stakes stress associated with face-to-face communication. From a cognitive perspective, the AI environment likely reduced learners' extrinsic cognitive load by eliminating the social threat of a human listener. Consequently, learners were able to allocate greater cognitive resources to lexical retrieval and phonological encoding, facilitating observable gains in fluency.

5.2 Interaction Mode and Linguistic Self-Efficacy

A central contribution of this research is the empirical distinction it draws between text-based and voice-based AI interactions. While prior literature has predominantly examined text-based chatbots (Dizon & Gayed, 2021), the current findings underscore the distinct pedagogical benefits of voice-driven agents. The capacity to simulate real-time dialogue and rehearse pronunciation in a low-stakes ecosystem significantly enhanced learners' linguistic self-efficacy. This finding extends the work of Dizon and Gayed (2021) by demonstrating that voice-based interaction may offer additional benefits for socio-affective outcomes due to its closer approximation to naturalistic communication.

Evidence from the post-test FLSAS indicates a reduced frequency of "word loss" during speech (Item 6) and an increased willingness to engage in peer communication (Item 23) among the experimental cohort. These results suggest that the confidence cultivated through AI-mediated interaction is transferable to broader communicative settings, thereby promoting a higher Willingness to Communicate (WTC) in alignment with Dörnyei and Al-Hoorie's (2022) motivational framework.

5.3 Contextual Significance: AI in Developing Regions

This study further contributes to the literature by demonstrating the viability of advanced AI interventions within developing educational infrastructures. The vast majority of Computer-Assisted Language Learning (CALL) research is situated within resource-rich environments; however, the present study illustrates that localized, self-hosted AI solutions are both feasible and highly impactful in settings where technological integration is nascent.

The success of the intervention at one University indicates that researcher-developed tools can effectively bypass infrastructural constraints to provide scalable, personalized oral practice. These findings hold particular significance for the Libyan EFL context—where classrooms are traditionally large and teacher-centered—demonstrating that localized AI tools can democratize access to high-quality speaking practice.

5.4 Limitations and Future Research

Despite these promising findings, several limitations must be acknowledged. First, the study relied on self-reported data from the FLSAS, which may be susceptible to social desirability bias. Second, while the eight-week intervention period was sufficient to observe acute psychological shifts, it precludes the assessment of long-term retention.

Future research should employ longitudinal designs to examine the durability of these anxiety reductions and confidence gains over time. Additionally, incorporating objective metrics of oral proficiency—such as acoustic fluency, syntactic accuracy, and lexical complexity—would provide a more holistic understanding of how reduced anxiety translates into measurable linguistic performance. Finally, investigating the interplay of multiple psychological constructs (anxiety, confidence, and WTC) across larger, more diverse EFL populations would further strengthen the generalizability of these findings.

6. Conclusion

This study investigated the pedagogical impact of a self-hosted AI voice chatbot on the speaking anxiety and communicative confidence of university-level EFL learners in Libya. The quantitative results demonstrate that AI-mediated speaking practice significantly outperforms conventional classroom instruction in mitigating FLSA. By providing a low-pressure, asynchronous environment, the localized AI tool enabled learners to transition from entrenched avoidance behaviors to proactive communication, empirically validating the role of targeted technology in lowering the affective filter.

The findings contribute to the existing literature in three key ways. First, they provide empirical evidence that voice-based AI chatbots can effectively reduce FLSA, addressing a significant gap in research that has predominantly focused on text-based agents. Second, they demonstrate that researcher-developed, self-hosted AI tools are viable and scalable within developing educational contexts, where commercial platforms may be inaccessible. Third, they establish a sequential link between reduced anxiety, increased self-efficacy, and enhanced behavioral participation, offering a holistic understanding of AI's socio-affective impact.

From a pedagogical standpoint, these findings advocate for the strategic integration of AI conversational agents into blended speaking curricula. In high-anxiety or resource-constrained EFL contexts, instructors can deploy localized AI chatbots as low-stakes, supplementary preparatory tools before oral exams or in-class speaking activities. This provides learners with a private space for skill rehearsal, effectively fostering oral fluency and communicative confidence before they are subjected to peer or teacher evaluation.

Ultimately, this research provides compelling evidence that localized AI conversational agents are viable, scalable instruments for overcoming psychological barriers in language learning. As artificial intelligence continues to evolve, its application in under-resourced settings holds transformative potential, shifting traditional EFL instruction toward more supportive, learner-centered, and communicatively successful environments.

References

- Alkarkhi, S. I., & Hmouma, M. A. A. (2025). The effects of well-being, resilience, work environment and job satisfaction on foreign language teaching enjoyment in Libyan context. *IOSR Journal of Humanities and Social Science (IOSR-JHSS)*, 30(11), 49–68. <https://doi.org/10.9790/0837-3011034968>
- Chen, L., Chen, P., & Lin, Z. (2020). Artificial intelligence in education: A review. *IEEE Access*, 8, 75264–75278. <https://doi.org/10.1109/ACCESS.2020.2988510>
- Chen, X., Zou, D., Cheng, G., & Xie, H. (2023). Artificial intelligence-supported language learning: A systematic review of research from 2010 to 2022. *Computers and Education: Artificial Intelligence*, 4, Article 100127. <https://doi.org/10.1016/j.caeai.2023.100127>
- Dizon, G. (2022). The effectiveness of AI chatbots in language learning: A systematic review. *Computer Assisted Language Learning Electronic Journal*, 23(1), 1–22.
- Dizon, G., & Gayed, J. M. (2021). Examining the impact of AI chatbot interaction on EFL learners' willingness to communicate. *Computer Assisted Language Learning Electronic Journal*, 22(3), 1–16.
- Dörnyei, Z., & Al-Hoorie, A. H. (2022). *The motivational foundation of learning languages in the digital age*. Multilingual Matters.

- Fryer, L., & Nakao, K. (2021). Chatbots for language learning: Investigating learning outcomes and learner perceptions. *ReCALL*, 33(1), 1–19. <https://doi.org/10.1017/S095834402000021X>
- 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>
- Huang, J., Hew, K. F., & Fryer, L. (2022). Chatbots for language learning: A review of recent developments and future directions. *Educational Technology & Society*, 25(1), 1–15.
- Huang, R., Spector, J. M., & Yang, J. (2021). Educational technology and artificial intelligence: Opportunities and challenges for language learning. *Educational Technology Research and Development*, 69(1), 1–6. <https://doi.org/10.1007/s11423-021-09966-5>
- Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Pergamon Press.
- Liu, M. (2021). Foreign language anxiety and willingness to communicate in EFL classrooms. *System*, 96, Article 102402. <https://doi.org/10.1016/j.system.2020.102402>
- Hmouma, M., & Benarose, A. (2026). The Effectiveness of Using Artificial Intelligence on Learning Vocabulary among Libyan EFL University Undergraduates at Zawia University. *International Journal of Peer-Reviewed Multidisciplinary Research*, 2(1), 12-18. <https://ijprmr.com/index.php/ijprmr/article/view/10>
- Plonsky, L., & Oswald, F. L. (2020). How big is “big”? Interpreting effect sizes in L2 research. *Language Learning*, 70(4), 878–912. <https://doi.org/10.1111/lang.12426>
- Teimouri, Y., Goetze, J., & Plonsky, L. (2022). Second language anxiety and achievement: A meta-analysis. *Studies in Second Language Acquisition*, 44(2), 363–387. <https://doi.org/10.1017/S0272263121000311>
- Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2022). Systematic review of research on artificial intelligence applications in higher education. *International Journal of Educational Technology in Higher Education*, 19(1), Article 23. <https://doi.org/10.1186/s41239-022-00326-4>
- Sadighi, F., & Dastpak, M. (2017). The Sources of Foreign Language Speaking Anxiety of Iranian English Language Learners. *International Journal of Education and Literacy Studies*, 5(4), 111-115.