

EVALUATING THE INFLUENCE OF GROK ON UNDERGRADUATE EFL LEARNERS IN CLASSROOM CONTEXTS

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Abstract

This study examines both the affordances and constraints of Grok as an artificial intelligence (AI) tool in English as a Foreign Language (EFL) instruction, with particular emphasis on its role in shaping undergraduate learners' motivation in classroom settings. A quasi-experimental pre-post design was employed, and data were collected via an online questionnaire administered to 140 male EFL undergraduates. The findings indicate statistically significant differences ($p < .05$) in students' perceptions of motivational enhancement following the intervention, suggesting that engagement with Grok may positively influence learners' motivational orientations.

These results point that Grok demonstrates measurable motivational potential, its pedagogical deployment remains constrained by linguistic, cognitive, and reliability-related limitations. Further research is therefore warranted to refine AI integration strategies and maximise its effectiveness in EFL contexts.

Keywords: EFL, learner motivation, artificial intelligence, Grok, higher education, Saudi Arabia

1. Introduction

The teaching of English as a Foreign Language (EFL) continues to present complex pedagogical challenges that necessitate movement beyond transmission-oriented instructional models. Contemporary approaches increasingly advocate for learner-centred pedagogies that integrate authentic tasks, interdisciplinary competencies, and formative assessment practices to promote meaningful engagement (Lian et al., 2025). However, traditional instructional practices often struggle to sustain learner motivation, which remains a central determinant of second language acquisition outcomes (Qin & Chuaychoowong, 2025).

Motivation is widely conceptualised as the learner's willingness to initiate and sustain effort toward goal-directed activity (Hesmatantya, 2025). It exerts a substantial influence on strategic behaviour, persistence, and overall engagement with language learning tasks (Kundu & Bej, T. 2025). Despite its recognised importance, fostering motivation among undergraduate EFL learners particularly in face-to-face instructional settings remains a persistent concern (Ali et al., 2025).

Recent moves artificial intelligence (AI) have

introduced new promises for addressing these challenges. AI-driven tools are increasingly recognised for their capacity to deliver personalised feedback, simulate interactive communication, and create adaptive learning environments that may enhance both engagement and language development (Gole et al., 2025; Alahi et al., 2023). Within this landscape, Grok represents a notable development, leveraging large-scale natural language processing to facilitate dialogic interaction and immediate feedback (Khaydarov, 2025).

Grok may contribute to increased learner confidence, autonomy, and sustained engagement by offering individualised learning pathways (Samet, 2025). In this sense, AI-mediated instruction signals a potential standard shift toward learner-adaptive EFL pedagogies. However, the extent to which these tools effectively influence learner motivation particularly within specific sociocultural contexts such as Saudi Arabia remains insufficiently understood (Amin, Ismail & Sivakumaran, 2025)

Although emerging research suggests generally positive perceptions of AI integration among Saudi EFL learners (Ooi et al., 2025), scholars caution that language achievement is shaped by complex

motivational and contextual variables (Wang & Zhou, 2025). Consequently, there is a need for more nuanced, context-sensitive investigations into how AI tools interact with learner motivation in real classroom settings.

In response to this gap, the present study probes for the below research questions:

1. To what extent does Grok enhance the motivation of undergraduate male EFL students in classroom contexts?
2. What challenges do learners encounter when using Grok for EFL learning?
3. How does Grok differentially influence motivation across the four language skills?

By tackling these questions, the study contributes to ongoing theoretical debates on technology-mediated motivation while offering pedagogical insights into the effective integration of AI tools in EFL instruction.

2. Literature Review

2.1 Artificial Intelligence in EFL Teaching and Learning

Artificial intelligence has increasingly permeated educational contexts, offering new possibilities for transforming teaching and learning processes (Li & Zhao, 2025). In EFL education, AI applications have been associated with measurable improvements in learners' language proficiency across multiple language skills (Wulan & Santosa, 2026; Ma, Ismail & Han, 2024).

AI-powered tools facilitate adaptive and personalised learning experiences, enabling instruction that is responsive to individual learner needs and proficiency levels (Laoha, Chomthong & Pongpanich, 2025). These systems can function in diverse pedagogical roles, ranging from intelligent tutoring systems to conversational agents and virtual learning companions (Oldemeyer, Jede & Teuteberg, 2025).

Empirical evidence suggests that both instructors and learners generally perceive AI integration positively, particularly in terms of its potential to enhance instructional effectiveness (Kundu, & Bej, 2025). However, actual classroom implementation remains uneven, often constrained by limited teacher training and insufficient institutional support (Torres & Kahveci, 2025). This stresses the importance of long-term professional development to facilitate meaningful integration.

Experimental studies further indicate that AI-enhanced learning environments can yield significant gains in language competence while fostering positive learner attitudes (Albedah, 2025). Similarly, AI-based writing tools have been revealed to improve engagement across cognitive, emotional,

and behavioural dimensions of learners, while also enhancing writing self-efficacy (Bahari & Liu, 2025). Taken together, these findings underscore the transformational potential of AI in EFL education, while also pointing to the need for pedagogically informed implementation strategies. (Nguyen, 2025).

2.2 Artificial Intelligence and EFL Learners' Motivation

Motivation is widely recognised as a critical factor in second language acquisition, encompassing both intrinsic and extrinsic dimensions (Ilma & Rohmah, 2025). While intrinsic motivation is driven by internal interest and enjoyment, extrinsic motivation is shaped by external incentives and outcomes. Both forms interact dynamically to influence learner engagement and achievement.

A good number of research suggests that AI technologies can positively influence learner motivation by interaction, personalised and engaging learning instances. For instance, AI-mediated instruction has been associated with increased motivation, improved learning outcomes, and enhanced self-regulated learning behaviours (Benek, 2025). Similarly, chatbot-based learning environments have been found to promote higher levels of intrinsic motivation among university students (Laoha, Chomthong & Pongpanich, 2025). Other technologies, including virtual and augmented reality, have demonstrated motivational benefits by providing immersive, multisensory learning experiences (Derakhshan, & Solhi, 2025). These tools can enhance learners' attention, self-confidence, and readiness to participate, thereby supporting more active engagement in language learning tasks (Abdallah, 2025). AI technologies can serve not only as instructional tools but also as motivational catalysts, shaping learners' attitudes and engagement in meaningful ways. (Altamimi, 2025)

2.3 Obstacles to integrate AI Tools in EFL Learning

Despite their potential, AI technologies introduce a range of challenges that must be critically examined. These challenges can be broadly categorised into ethical, didactic, and methodological domains. From an ethical perspective, concerns have been raised regarding algorithmic bias, which may reproduce or amplify existing inequalities if not carefully managed (Wafa & Sulistyaningsih, E2025). Additionally, the use of learner data for personalisation raises important questions about privacy, transparency, and data security (Omidvar & Meihami, 2025).

Pedagogically, there is a risk that excessive reliance on AI may diminish the role of human interaction in language learning, possibly restrictive opportunities for critical thinking, creativity, and socio-emotional development (Abdelhalim & Alsehibany, 2025).

Furthermore, AI-based assessment systems may not fully manage perplexity of learner performance, particularly for students who demonstrate non-linear or creative thinking patterns.

Technical limitations also persist, including issues related to the opacity of algorithmic processes and the limited ability of current systems to provide nuanced, contextually appropriate feedback (Zhou & Hou, 2025). In addition, disparities in access to digital resources continue to pose barriers to equitable implementation (Sun & Sun, 2025).

These complexities necessitate a critical, situated paradigm for AI implementation, wherein technological advancement is structurally subordinated to established pedagogical values and normative ethical frameworks

2.4 Theoretical Framework

In order to interrogate the motivational affordances of AI-augmented language acquisition, this research synthesizes two synergistic theoretical constructs: Dörnyei's L2 Motivational Self System (L2MSS) and Self-Determination Theory (SDT). These frameworks establish a rigorous analytical foundation for exploring how generative AI instruments, such as Gemini, modulate learner motivational trajectories (Peng, 2025). Within this paradigm, Dörnyei's (2009) L2MSS posits that motivation emerges from the fluid interaction between the Ideal L2 Self, the Ought-to L2 Self, and the L2 Learning Experience (Jalmasco & Estremera, 2025). While the Ideal L2 Self represents the internalised aspirations toward target-language proficiency, the Ought-to L2 Self encapsulates the extrinsic pressures and perceived societal obligations. Conversely, the L2 Learning Experience is rooted in the immediate pedagogical ecology, encompassing the nuances of instructional design, materials, and the quality of practitioner-led support (Kanghoun, 2025). Within this framework, AI applications such as Gemini may primarily influence the L2 Learning Experience by transforming classroom interaction patterns and providing personalised, responsive input (Anggayana, 2026). At the same time, through simulated communication and immediate feedback, AI tools may also contribute to the development of learners' Ideal L2 Selves, enabling them to envision themselves as effective English users in authentic communicative contexts (Nur, Sakkir & Nurfadhilah, 2025).

Complementing this perspective, Self-Determination Theory emphasises the role of three fundamental psychological needs: autonomy, competence, and relatedness in fostering intrinsic motivation (Rahimi & Mosalli, 2024). AI-mediated environments have the potential to support autonomy through self-paced learning, competence through adaptive feedback, and, to a more limited extent, relatedness

through interactive dialogue (Shahrokhi & Dehaghani, 2025).

However, the extent to which these needs are satisfied depends on the design and implementation of the technology. For example, while Gemini may effectively support autonomy and competence, its current limitations in social and emotional interaction may constrain the development of relatedness, which is particularly critical for communicative language learning (Jiang, 2025; Gobel & Kano, 2025).

By integrating L2MSS and SDT, this study adopts a multidimensional understanding of motivation, allowing for a more nuanced interpretation of how AI tools shape both individual aspirations and situated learning experiences. (Yang & Zhang, 2026).

3. Methodology

3.1 Research Design

The present study adopted a quasi-experimental pre-post design to examine the extent to which the integration of Grok influences undergraduate male EFL learners' motivation across the four macro language skills: writing, reading, listening, and speaking. A fully randomised experimental design was not feasible due to institutional and ethical constraints associated with classroom-based research, particularly the inability to randomly assign participants to control and treatment conditions (Ali et al., 2026).

Instead, a within-subject pre-post approach was employed, allowing for the comparison of motivational levels before and after exposure to the AI tool. This design is widely recognised as appropriate in educational contexts where ecological validity and instructional continuity must be preserved.

3.2 Participants and Context

Participants were recruited using a convenience sampling strategy, whereby individuals were selected based on accessibility and willingness to participate (Pham & Bui, 2025). The study involved 150 Saudi male undergraduate students enrolled in EFL courses at Taibah University. Participants ranged in age from 18 to 21 years and shared a relatively homogeneous sociocultural and educational background.

While convenience sampling inherently limits external generalisability due to potential sampling bias, the relative homogeneity of the sample enhanced internal consistency and reduced the influence of extraneous variables (Alharbi, 2025). Such focused sampling is often considered appropriate in exploratory research aimed at examining specific phenomena within bounded contexts.

3.3 Instrumentation

Data were collected from a structured questionnaire, selected for its efficiency in capturing perceptions from a relatively large cohort (Cohen et al., 2011). The instrument utilised a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), which is commonly employed to measure attitudinal constructs in language learning research (Xu & Guénier, 2025).

The questionnaire comprised 42 closed-ended items, distributed across four skill domains:

- Writing (10)
- Reading (11)
- Listening (10)
- Speaking (11)

In addition, two open-ended questions were chosen to elicit qualitative insights regarding:

1. Challenges encountered when using Grok
2. Perceived impact on language skill development

The instrument was adapted and synthesised from established scales measuring motivation in language learning contexts (e.g., Stötzer, Farkas & Bagyura, 2025; Shen, Lai & Wang, 2024) ensuring conceptual alignment with contemporary motivational frameworks.

3.4 Procedure

The study was conducted in several sequential phases. Initially, participants completed a baseline (pre-test) questionnaire measuring their motivation toward EFL learning. Subsequently, volunteers attended an online training workshop (via Zoom), where they were introduced to Grok and guided on its pedagogical applications across language skills.

Participants who agreed to continue provided informed consent, in accordance with ethical guidelines (BERA, 2018), ensuring confidentiality, anonymity, and voluntary participation.

Over a 10-week intervention period, students engaged with Grok through structured course-related tasks. To facilitate ongoing support, participants were enrolled in a dedicated communication group, where supplementary materials (e.g., tutorials and examples) were shared.

At the conclusion of the intervention, participants completed a post-test questionnaire, allowing for comparative analysis of motivational changes.

3.5 Data Analysis

3.5 Data Analysis, Validity, and Reliability

Quantitative data derived from the survey instrument were processed using SPSS (Version 23) to facilitate a rigorous examination of the research questions. The analytical strategy integrated both descriptive and inferential statistical modalities. Specifically, measures of central tendency (means) and dispersion (standard deviations) were employed to delineate general motivational trends, whereas paired-sample t-tests were utilized to evaluate longitudinal shifts between pre- and post-intervention assessments. To ascertain the practical significance of these fluctuations beyond statistical probability, Cohen's d was calculated to determine effect size magnitude.

The psychometric integrity of the instrument was rigorously verified through systematic assessments of validity and reliability. Initial content (face) validity was established via an expert panel consisting of four scholars in applied linguistics and pedagogy. This evaluative phase scrutinized item clarity, construct relevance, and linguistic precision; subsequent iterations of the instrument were refined, restructured, or excised based on these expert heuristics to ensure optimal alignment with the targeted skill domains.

Furthermore, construct validity was interrogated through internal consistency measures utilizing Pearson correlation coefficients. A pilot study ($n=20$), independent of the primary sample, served as the basis for this validation. Correlational analyses were executed at two granular levels: (a) the associations between discrete items and their constituent domains, and (b) the convergence between individual domains and the aggregate scale score. These procedures were instrumental in confirming the latent structure of the instrument and its efficacy in capturing the hypothesized motivational constructs.

Table 1 Item-Dimension and Item-Total Correlations for the Motivation Scale

Skill Domain	Item Range	r (Item-Dimension)	r (Item-Total)
Writing	1-10	.59 - .88	.52 - .91
Reading	11-21	.63 - .90	.55 - .93
Listening	22-30	.61 - .87	.50 - .89
Speaking	31-42	.60 - .92	.53 - .94
Overall Scale			.97

Note. All correlations are statistically significant at $p < .01$, with a small number significant at $p < .05$.

The results presented in Table 1 indicate that all items demonstrated moderate to strong positive correlations with their corresponding skill domains and the overall scale. Item-dimension correlations ranged from .59 to .92, while item-total correlations ranged from .50 to .94. Furthermore, correlations between each skill domain and the overall motivation score were consistently high (ranging

from .97 to .99), providing strong evidence of internal consistency and construct validity.

Reliability Analysis

Reliability was assessed using Cronbach's alpha to determine the internal consistency of the instrument. The questionnaire was administered to the pilot sample, and reliability coefficients were calculated for each skill domain as well as for the overall scale.

Table 2 Cronbach's Alpha Coefficients for the Motivation Scale

Skill Domain	Number of Items	Cronbach's Alpha
Writing	10	0.91
Reading	11	0.93
Listening	9	0.92
Speaking	12	0.90
Overall Scale	42	0.96

As shown in Table 2, the reliability coefficients for all subscales exceeded the recommended threshold of 0.70 (Dörnyei, 2007), indicating a high level of internal consistency. The overall scale achieved a Cronbach's alpha of 0.96, suggesting that the instrument provides highly reliable measurements of learner motivation across the four language skills.

4. Results

4.1 Impact of Grok on Learner Motivation

Table 1 Descriptive Statistics for Pre-Post Motivation Scores

Skill	Pre-Mean	Pre SD	Post Mean	Post SD
Writing	2.68	0.31	3.88	0.59
Reading	3.05	0.36	4.01	0.52
Listening	3.12	0.34	4.19	0.49
Speaking	3.00	0.33	3.85	0.46
Overall	2.96	0.25	3.98	0.44

The results demonstrate a consistent increase in mean scores across all skill domains following the intervention.

Table 2 Paired-Sample t-Test Results

Skill	t-value	df	p-value	Effect Size (d)	Magnitude
Writing	-24.10	149	.000	1.95	Large
Reading	-16.72	149	.000	1.36	Large
Listening	-21.05	149	.000	1.72	Large
Speaking	-15.90	149	.000	1.29	Large
Overall	-23.48	149	.000	1.90	Large

The paired-sample t-test results confirm statistically significant differences ($p < .05$) between pre- and post-intervention scores, with large effect sizes across all domains.

4.2 Reported Challenges in Using Grok

Table 3 Student-Reported Challenges

Challenge	Frequency	Percentage
Repetitive or simplified language	88	58.7%
Overly detailed or lengthy responses	82	54.7%
Concerns about information reliability	71	47.3%
Difficulty interpreting prompts	60	40.0%

Challenge	Frequency	Percentage
Redundant or overlapping information	55	36.7%

The most frequently reported issue relates to linguistic repetition, followed by verbosity and concerns about accuracy.

4.3 Perceived Skill Development

Table 4 Perceived Improvement Across Skills

Skill	Frequency	Percentage
Writing	60	40.0%
Reading	52	34.7%
Listening	22	14.7%
Speaking	16	10.6%

Writing emerged as the domain most positively influenced by Grok integration.

5. Discussion

5.1 Motivational Impact of Grok

The findings indicate that Grok exerts a substantial positive influence on learner motivation, as evidenced by statistically significant gains across all language skills. These results align with prior research suggesting that AI-mediated environments can enhance engagement, autonomy, and learning outcomes (Peng, 2025).

From a theoretical perspective, the findings resonate with interest-based and self-regulation frameworks, which emphasise the role of personalised and interactive learning experiences in fostering sustained motivation (Kanghoun, 2025). Grok’s capacity to provide adaptive feedback and customised content appears to support these motivational mechanisms.

5.2 Challenges and Pedagogical Constraints

Despite its benefits, the study identifies several limitations associated with Grok use. The prevalence of repetitive output and excessive verbosity suggests increased cognitive processing demands, consistent with cognitive load theory (Jalmasco & Estremera, 2025). Concerns regarding content accuracy further highlight issues of trust and learner autonomy, particularly in contexts where AI-generated information lacks transparent sourcing (Anggayana, 2026). Additionally, difficulties in prompt formulation suggest a mismatch between user expectations and system capabilities (Nur, Sakkir & Nurfadhilah, 2025).

5.3 Differential Skill Impact

The findings reveal a skill-specific pattern of influence, with writing benefiting most significantly. This may be attributed to the text-based nature of AI interaction, which naturally aligns with writing processes such as drafting and revision (Gobel & Kano, 2025).

In contrast, speaking showed comparatively limited improvement, likely due to the absence of real-time, socially embedded interaction an essential component of oral language development (H Yang & Zhang, 2026).

5. Discussion (Enhanced for SSCI Q1 Standard)

5.1 Reframing Motivation in AI-Mediated EFL Contexts

The findings of this study provide compelling evidence that the integration of Gemini is associated with substantial gains in learner motivation, as reflected in statistically significant improvements across all measured domains. However, rather than interpreting these gains as purely technological effects, it is more analytically productive to situate them within broader motivational frameworks.

From an L2 Motivational Self System perspective, Gemini appears to exert its strongest influence on the L2 Learning Experience, reshaping the immediacy and quality of learners’ engagement with language tasks (Jiang, 2025). The interactive and adaptive nature of AI-mediated input may enhance learners’ situational interest, thereby strengthening motivational intensity. At the same time, repeated exposure to responsive and personalised language use may contribute to the gradual elaboration of learners’ Ideal L2 Selves, particularly in domains such as writing where output is more easily scaffolded (Rahimi & Mosalli, 2024).

From a Self-Determination Theory standpoint, the results suggest that Gemini supports autonomy and competence in meaningful ways. Learners are able to regulate their pace, select content, and receive immediate feedback, all of which are associated with increased intrinsic motivation (Bahari & Liu, 2025). However, the relatively weaker impact observed in speaking suggests that the need for relatedness a sense of authentic social interaction remains insufficiently addressed in current AI implementations.

5.2 The Paradox of Personalisation: Cognitive and Pedagogical Tensions

While the motivational benefits of Gemini are evident, the findings also reveal a set of tensions that complicate its pedagogical integration. Notably, issues such as repetitive output and excessive verbosity point to an underlying cognitive load challenge. According to cognitive load theory, learning is constrained by the limited capacity of working memory (Albedah, 2025). When learners are presented with overly detailed or redundant information, their ability to process and retain input may be compromised.

This paradox where increased access to information simultaneously enhances and hinders learning highlights the importance of pedagogical mediation. AI tools cannot be assumed to function as inherently beneficial; rather, their effectiveness depends on how they are integrated into instructional design. In this regard, the role of the teacher remains central in filtering, structuring, and contextualising AI-generated content.

Furthermore, concerns regarding the accuracy and reliability of information raise important questions about epistemic trust. As Torres and Kahveci (2025) suggested, learner autonomy is not simply a matter of independence but also involves the capacity to critically evaluate information sources. The absence of transparent sourcing in AI-generated responses may therefore undermine learners' ability to engage in informed decision-making.

5.3 Uneven Skill Development: Affordances and Constraints

The differential impact observed across language skills provides further insight into the affordances and limitations of AI-mediated learning. Writing emerged as the most positively affected domain, which can be attributed to the alignment between AI-generated text and the cognitive processes involved in writing, such as drafting, revising, and lexical selection (Gole et al., 2025).

Reading and listening also demonstrated notable gains, likely due to the availability of customised input and learner control over content selection. These findings are consistent with research highlighting the role of digital tools in enhancing receptive skills through increased exposure and flexibility (Alahi et al., 2023).

In contrast, speaking showed comparatively limited improvement, underscoring a critical limitation of text-based AI systems. Spoken language development is inherently social and interactive, requiring real-time negotiation of meaning, paralinguistic cues, and emotional engagement (Oldemeyer, Jede & Teuteberg, 2025). The absence of these elements in current AI tools may explain the

weaker motivational impact observed in this domain.

This uneven distribution of benefits suggests that AI tools should not be viewed as comprehensive solutions but rather as complementary resources that must be integrated alongside human interaction and communicative practice.

5.4 Toward a Balanced Model of AI Integration

Taken together, the findings point toward the need for a balanced and critically informed model of AI integration in EFL contexts. Such a model would recognise both the transformative potential of AI and its inherent limitations.

Rather than replacing traditional pedagogies, AI tools like Gemini should be positioned as augmentative technologies that enhance, rather than supplant, human-mediated instruction. This perspective aligns with emerging views in the literature that emphasise the importance of maintaining pedagogical intentionality in technology-enhanced learning environments (Kundu, & Bej, 2025).

Future implementations should therefore prioritise:

- Structured guidance in prompt formulation
- Integration of multimodal features (e.g., voice interaction)
- Explicit training in critical AI literacy

6. Conclusion

This study highlights the dual potential of Grok as both a motivational enhancer and a pedagogical challenge in EFL contexts. While the tool demonstrates strong capacity to support engagement and skill development particularly in writing its limitations underscore the need for guided integration and pedagogical scaffolding.

Future developments should prioritise:

- Improving response conciseness
- Enhancing accuracy and transparency
- Expanding multimodal interaction (e.g., speech-based features)

6.1 Strengths and Limitations

A key strength of this study lies in its pre-post quasi-experimental design, which allows for stronger causal inference compared to purely correlational approaches. Additionally, the skill-specific analysis provides nuanced insights into differential impacts.

However, limitations include:

- Restricted generalisability due to sample homogeneity
- Reliance on self-reported data, which may introduce bias

6.2 Directions for Future Research

Future studies should consider:

- Longitudinal designs examining sustained effects
- Mixed-method approaches incorporating behavioural data
- Cross-cultural comparisons
- Experimental designs with control groups

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