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GAMIFIED LANGUAGE LEARNING APPS AND WRITING SKILLS ENHANCEMENT: AN EXPERIMENTAL STUDY OF INTERMEDIATE STUDENTS AT MIANWALI

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Abstract

The present quasi-experimental study investigated the effectiveness of the gamified language learning application Duolingo in enhancing ESL writing skills among intermediate students in District Mianwali, Punjab, Pakistan. Grounded in Vygotsky's Sociocultural Theory, Krashen's Input Hypothesis, and Self-Determination Theory, the study addressed the persistent problem of low writing proficiency and high writing anxiety in public sector colleges. A purposive sample of 60 intermediate students from two colleges participated. The experimental group n = 30 received an 8-week intervention integrating Duolingo with teacher-led instruction, while the control group n = 30 received traditional instruction. Data were collected using a researcher-developed Writing Skills Test measuring grammar accuracy, sentence structure, paragraph development, and essay writing, and a Student Perception Questionnaire. Paired-samples t-tests revealed statistically significant and very large improvements in total writing scores $t(59) = -10.69$, $p < .001$, $d = 1.38$, with a mean gain of 10.65 marks. Sub-skill analysis showed very large effects for essay writing $d = 1.29$ and paragraph writing $d = 1.06$, a medium effect for sentence structure $d = 0.50$, and no significant effect for grammar accuracy $d = 0.03$. Students reported high motivation and reduced anxiety. The findings indicated that a Duolingo-based gamified intervention can significantly improve discourse-level writing in low-resource contexts by lowering the affective filter and providing scaffolded practice, though explicit grammar instruction remains necessary. The study recommends integrating Duolingo into the intermediate English curriculum and providing teacher training on blended pedagogy. Limitations include the quasi-experimental design, short duration, and single-district sample.

Keywords: gamification, mobile-assisted language learning, ESL writing, intermediate students, Mianwali, Duoling.

Introduction

The proliferation of mobile-assisted language learning (MALL) has redefined ESL pedagogy, with gamified applications emerging as transformative tools that integrate points, badges, adaptive feedback, and competitive challenges to enhance learner engagement. These platforms are designed to alleviate writing anxiety and convert traditional, monotonous writing exercises into interactive, goal-oriented tasks, thereby addressing the motivational and cognitive barriers prevalent in conventional instruction. In Pakistan, where English writing proficiency critically influences academic progression, such technological interventions present a promising

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alternative to rote-based approaches that frequently fail to cultivate functional writing competence. Despite the theoretical appeal of gamification, its empirical effectiveness in developing specific writing sub-skills remains under-researched within local educational ecosystems (Usman et al., 2025).

The severity of this gap is starkly illustrated by the 2025 BISE Sargodha results, which report that 67% of intermediate students in Mianwali scored below 50% in English Paper-II, the component evaluating composition and comprehension. A qualitative review of answer scripts reveals a critical disconnect: students exhibit grammatical accuracy at the sentence level but consistently fail to organize ideas into coherent paragraphs or essays. This suggests that the pedagogical challenge transcends linguistic knowledge and extends to discourse-level organization and rhetorical structuring. While teachers cite insufficient curricular time for extended writing practice, students attribute their reluctance to boredom and fear of negative evaluation. Consequently, this quasi-experimental study investigates the efficacy of gamified language learning applications in enhancing ESL writing skills among intermediate students in Mianwali. The research specifically examines whether there is a statistically significant difference in overall writing scores following the intervention, evaluates the extent of improvement across discrete sub-skills-grammar, sentence construction, paragraph writing, and essay writing, compares the writing performance of the experimental group against a control group receiving traditional instruction, and explores students' attitudes toward using gamified apps for learning ESL writing. Through this multi-dimensional inquiry, the study aims to generate contextually relevant evidence to inform the integration of gamified technologies in writing instruction across similar semi-urban Pakistani settings.

Background of the Study

The digital transformation of education has accelerated dramatically in the post-pandemic era, with mobile-assisted language learning (MALL) emerging as a dominant paradigm in English as a Second Language (ESL) pedagogy (Burston, 2024; Kukulska-Hulme & Viberg, 2023). Global smartphone penetration reached 6.8 billion users in 2024, with 85% of learners aged 15 to 24 reporting daily use of educational apps. Within this landscape, gamification has shifted from a peripheral motivational tool to a core instructional strategy. Defined as the integration of game design elements such as points, badges, leaderboards, narrative, and immediate feedback into non-game contexts (Deterding et al., 2011; Sailer et al., 2024), gamification aligns with contemporary theories of learner engagement and self-determination (Deci & Ryan, 2020). Meta-analyses indicate that gamified interventions produce moderate to large effect sizes on language learning outcomes, with writing and vocabulary showing the most consistent gains $d = 0.67$, $p < .001$ (Dehghanzadeh et al., 2025). The relevance of gamification to ESL writing is particularly salient. Writing is widely recognized as the most cognitively demanding of the four language skills, requiring simultaneous control of content, organization, grammar, lexis, and mechanics (Hyland, 2022). For ESL learners, this complexity is compounded by affective barriers including writing anxiety, fear of negative evaluation, and low self-efficacy. Traditional product-oriented approaches, still prevalent in many South Asian classrooms, emphasize error correction and accuracy over fluency and idea development, often resulting in demotivation (Fareed et al., 2023). In contrast, gamified platforms reconceptualize writing as a low-stakes, iterative, and social

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activity. These features operationalize key principles from sociocultural theory, where learning occurs through mediated interaction in the zone of proximal development (Vygotsky, 1978), and from Krashen's (1982) input hypothesis, which posits that comprehensible input plus low affective filter facilitates acquisition.

Pakistan presents a critical case for examining this intersection of technology and pedagogy. English serves as the medium of instruction in higher education and a prerequisite for civil service and private sector employment, yet national assessments consistently report weak productive skills. In Punjab, the largest province, intermediate-level students score an average of 42% on board examinations for English Composition, with organization and content identified as the weakest components. The situation in District Mianwali exemplifies broader systemic challenges. As a predominantly rural and semi-urban district with a population of 1.8 million, Mianwali faces acute resource constraints. English teachers predominantly employ the grammar-translation method, characterized by explicit rule instruction, L1 explanation, and rote memorization of essays (Akram, 2024; Manan et al., 2023). Classroom observations conducted by the researcher in 2024 across three public colleges revealed that students write an average of one paragraph per week, receive delayed feedback, and rarely engage in process writing or peer review. Despite these constraints, mobile penetration offers an untapped opportunity. Informal surveys suggest 61% of intermediate students already use Duolingo or similar apps for vocabulary, though not systematically for writing (Raza, 2025). Bridging this digital use divide requires empirical evidence demonstrating that gamified apps can translate informal engagement into measurable academic gains, particularly in writing sub-skills.

Statement of the Problem

Recent BISE Sargodha results (2024) show that 67% of Mianwali students scored below 50% in English Paper-II, which assesses composition and comprehension. Qualitative analysis of answer scripts indicates that students can produce grammatically correct isolated sentences but fail to organize ideas into coherent paragraphs or essays. This suggests the problem is not merely linguistic but also rhetorical and cognitive. While teachers attribute this to lack of practice, students cite boredom and fear of making mistakes as primary deterrents. Thus, the problem is twofold: insufficient instructional time for writing and absence of engaging methodologies that lower the affective filter. Gamified apps directly target both issues by providing bite-sized, self-paced practice with instant, non-judgmental feedback. Yet, whether this translates into measurable gains in Mianwali classrooms remains untested.

Research Objectives

The primary objective of this study is to examine the effectiveness of gamified language learning applications in enhancing ESL writing skills. The specific objectives are:

1. To determine the difference in overall writing performance of intermediate students before and after the use of gamified language learning apps.
2. To evaluate the impact of gamified apps on specific sub-skills of writing: grammar, sentence structure, paragraph development, and essay writing.

Significance of the Study

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This research holds theoretical, practical, and pedagogical significance. Theoretically, it contributes to the growing body of literature on gamification in ESL by testing its applicability within Vygotskian and Krashenian frameworks in a Pakistani context. Practically, the findings will provide empirical data to the District Education Authority Mianwali and HEC regarding the viability of integrating mobile apps into the intermediate English curriculum. Pedagogically, the study offers English teachers evidence-based strategies to make writing instruction more engaging and student-centered. For learners, it may validate the use of familiar digital tools for academic improvement. Finally, app developers may gain insights into designing content that addresses specific writing weaknesses identified among Pakistani ESL Learners.

Literature Review

The empirical base for gamification in language learning has expanded rapidly. Zhang and Zou (2025) reviewed 94 studies from 2015–2024 and concluded that 78% reported significant positive effects on at least one language skill, with writing ranking third after vocabulary and grammar. Effect sizes were largest when interventions lasted 6–10 weeks, matched the duration of your study. Burston (2024) analyzed 37 MALL studies and found that app-based learning outperformed traditional instruction in 81% of cases, with a mean effect size of d = 0.73. Importantly, the benefits were consistent across high- and low-resource contexts, suggesting applicability to Mianwali. While initial studies on gamification predominantly examined vocabulary acquisition and grammar drills, recent scholarship has shifted towards investigating productive skills, particularly writing fluency and accuracy.

Duolingo has evolved from a vocabulary tool to a multi-skill platform. Its 2023 update introduced “Writing Exercises” requiring 1–3 sentence responses graded by AI (Duolingo Team, 2023). Shortt et al. (2023) tested these tasks with 150 Japanese university students. After 10 weeks, writing fluency measured by words per minute increased 27%, though accuracy gains were modest. Crucially, students reported that the absence of red-pen corrections reduced anxiety. In Pakistan, Raza (2025) surveyed 200 intermediate students and found 68% used Duolingo informally, but only 12% used it for writing. Those who did scored 9% higher on board-style essay tests. This suggests untapped potential for structured classroom integration.

Duolingo targets sentence-level accuracy through translation and “Fill-in-the-Blank” tasks, and paragraph coherence via its “Stories” feature, which models discourse structure. Chen et al. (2024) reported that Chinese EFL learners using Duolingo for 8 weeks produced more syntactically complex sentences, with significant gains in T-units per clause, d = 0.79. However, improvements in paragraph organization were limited without explicit instruction. In the Pakistani context, Ahmed (2023) implemented a 6-week Duolingo intervention with 40 intermediate college students and found significant gains in vocabulary and sentence formation, but no significant change in coherence scores, concluding that the app alone is insufficient for discourse-level skills. Siddiqui (2023) similarly observed that 80 Karachi intermediate students improved sentence translation accuracy by 4.2 points after Duolingo use, yet writing scores only increased when supplemented with teacher feedback on paragraph structure. This supports the claim that Duolingo provides comprehensible input for sentence construction but requires scaffolding to develop higher-order paragraph skills.

This section situates ESL writing instruction within Pakistan's unique socio-linguistic and educational landscape. The status of English in Pakistan is paradoxical: constitutionally an official

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language, yet pedagogically marginalized in public-sector classrooms. The Higher Education Commission's Undergraduate Education Policy 2023 now requires a compulsory 3-credit "Functional English" course focused on academic writing, creating downstream pressure on intermediate colleges to improve foundations. Despite this, empirical data from Boards of Intermediate and Secondary Education (BISE) confirm systemic writing deficits. BISE Lahore (2024) analyzed 50,000 answer scripts and found that 73% of students scored below 40% in "Essay and Paragraph Writing," with errors concentrated in organization 41%, content development 33%, and mechanics 26%. This "sentence-level ceiling" suggests instruction focuses on form rather than discourse. Three studies characterize intermediate classrooms in Punjab. Manan et al. (2023) conducted ethnographic observations and concluded that the Grammar-Translation Method (GTM) remains dominant.

The literature reveals critical gaps that this study addresses. International meta-analyses show writing is understudied compared to vocabulary. In Pakistan, only 2 quasi-experimental studies exist on gamified writing, both in urban/tertiary contexts. Furthermore, 89% of gamification studies occur in high-tech, urban settings, leaving rural Pakistani intermediate students, where infrastructure and teacher training differ markedly, largely unexamined. Most studies use holistic writing scores and no study disaggregates grammar, sentence, paragraph, and essay. The present study addresses these gaps by: (a) focusing on a rural district, (b) measuring four distinct sub-skills, (c) combining three apps, and (d) using inferential statistics to evaluate the effectiveness of a structured, multi-app intervention.

Research Methodology

This study employed a quantitative, quasi-experimental research design utilizing a pre-test/post-test non-equivalent control group format. Quasi-experimental designs are widely used in educational research when random assignment of participants to experimental and control conditions is not feasible due to administrative, ethical, or logistical constraints (Cohen et al., 2018; Mackey & Gass, 2022). In the context of Pakistani public sector colleges, students are enrolled in intact class sections by the college administration, making true random assignment impractical. Therefore, existing classes were designated as experimental and control groups. The target population for this study comprised all intermediate students, FA and FSc Part-I and Part-II, enrolled in public sector colleges affiliated with the Board of Intermediate and Secondary Education (BISE) Sargodha, located in District Mianwali, Punjab, Pakistan. A non-probability purposive sampling technique was used to select the sample. Based on the established criteria, two colleges were selected. The boys' section n = 30 was designated as the experimental group, and the girls' section n = 30 was designated as the control group, yielding a total sample size of 60 students. This sample size satisfies the minimum requirement of 30 participants per group for experimental research to achieve adequate statistical power.

Two primary instruments were utilized for data collection: the Writing Skills Test and the Student Perception Questionnaire. The Writing Skills Test is a researcher-developed instrument designed to assess students' writing proficiency comprising four sections: Grammar, Sentence Making, Paragraph writing, and Essay writing. The intervention for the experimental group was conducted for eight weeks during the academic session 2025-2026. The students were taught English writing skills using the Duolingo application for 30 minutes daily, 5 days a week, totaling 20 instructional hours. The intervention was integrated with explicit teacher instruction to ensure

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alignment with the BISE Sargodha syllabus for intermediate classes. The control group received the same number of instructional hours covering identical topics from the prescribed textbook but was taught through traditional methods including textbook reading, board explanations, and written exercises. All quantitative data were analyzed using IBM SPSS Statistics Version 27.0. The significance level for all statistical tests was set at α=.05. Paired-Samples T-tests were used to compare the pre-test and post-test scores within each group, and Independent-Samples T-tests were used to compare the post-test scores between the experimental and control groups to determine the effectiveness of the Duolingo-based intervention.

Data Analysis and Findings

This section presents the results of the statistical analyses conducted to examine the effectiveness of the Duolingo application in enhancing ESL writing skills among intermediate students in District Mianwali. The data were collected through the Writing Skills Test (WST) administered as a pre-test and post-test to 60 participants: 30 in the experimental group and 30 in the control group. The analysis is organized in accordance with the research questions and hypotheses stated in Section 1. This section includes descriptive statistics, results of paired-samples t-tests, independent-samples t-tests, hypothesis testing decisions, effect size calculations, and findings from the Student Perception Questionnaire.

Prior to analysis, all 60 pre-test and post-test scripts were scored using the analytic rubric described in Section 3. The scoring was done by the researcher to ensure consistency. Data were entered into IBM SPSS Statistics Version 27.0. Screening revealed no missing data, as all 60 participants completed both pre-test and post-test. Assumptions for paired-samples t-tests were tested. Shapiro-Wilk tests for normality of difference scores were non-significant for all variables: Grammar W=.97, p=.21; Sentence Construction W=.96, p=.08; Paragraph Writing W=.98, p=.45; Essay Writing W=.97, p=.19; Total Score W=.98, p=.51. This confirmed normality of the data. Boxplots revealed no extreme outliers. Therefore, the use of parametric tests was justified.

To determine whether the experimental and control groups were equivalent in their writing skills before the intervention, an independent samples t-test was conducted on the pre-test scores.

Table 1

Comparison of Pre-Test Scores Between Experimental and Control Groups

Group	N	Mean	SD	t-value	dif	Sig. (2-tailed)
Experimental	30	30.20	9.31	1.002	58	.313
Control	30	28.07	6.28			

Note: p > .05 indicates no significant difference

Table 1 shows the comparison of pre-test writing scores between the experimental and control groups. The mean score of the experimental group (M = 30.20, SD = 9.31) was slightly higher than the control group (M = 28.07, SD = 6.28). However, the independent samples t-test revealed that this difference was not statistically significant, t(58) = 1.02, p = .313. Since the p-value is greater than the .05 level of significance, it can be concluded that both groups were

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equivalent in their writing skills before the treatment. This establishes baseline homogeneity between the two groups, which is essential for comparing the effect of the intervention.

To examine the effectiveness of the mobile app on students' writing skills, an independent samples t-test was conducted on the post-test scores of both groups after the intervention period.

Table 2

Comparison of Post-Test Scores Between Experimental and Control Groups

Group	N	Mean	SD	t-value	dif	Sig. (2-tailed)
Experimental	30	42.53	5.31	4.89	58	0.000
Control	30	36.43	4.68			

Note: p < .001 indicates highly significant difference

Table 2 presents the comparison of post-test writing scores between the experimental and control groups. The experimental group (M = 42.53, SD = 5.31) significantly outperformed the control group (M = 36.43, SD = 4.68). The independent samples t-test confirmed that this difference was statistically highly significant, t(58) = 4.89, p < .001. The mean difference of 6.10 points indicates a substantial improvement in the writing skills of students who used the mobile app compared to those taught through the traditional method. Furthermore, the effect size calculated using Cohen's d was 1.26, which indicates a very large effect. According to Cohen's (1988) guidelines, this suggests that the mobile app intervention had a substantial practical impact on improving students' writing skills.

The results of the present study provide strong empirical evidence for the effectiveness of the Duolingo based interventions in enhancing students' writing skills. The analysis revealed two major findings. Baseline Equivalence: The non-significant difference in pre-test scores (p = .313) confirmed that both experimental and control groups possessed similar writing abilities before the intervention. This eliminates any initial bias and strengthens the internal validity of the study. Significant Impact of Intervention: The highly significant difference in post-test scores (p < .001) with a very large effect size (d = 1.26) demonstrates that the mobile app was significantly more effective than the traditional teaching method. The experimental group showed an average improvement of 12.33 points from pre-test to post-test, whereas the control group improved by only 8.36 points. Therefore, the null hypothesis stating that "There is no significant difference in the writing skills of students taught through a mobile app and those taught through the traditional method" is rejected. The findings conclude that the mobile app has a positive and significant effect on improving students' writing skills at the secondary level.

Based on the results in Table 4.1 and Table 4.2, the following decisions were made regarding the null hypotheses. H_{01}: There is no statistically significant difference in the pre-test writing scores of experimental and control group students. Decision: Accepted. t(58)=1.02, p=.313. Since p>.05, there was no significant difference between the experimental group and control group before the intervention. This indicates that both groups were equivalent at baseline. H_{02}: There is no statistically significant difference in the post-test writing scores of students taught through mobile app and those taught through traditional method. Decision: Rejected. t(58)=4.89, p<.001. There was a highly significant difference favoring the experimental group. The students

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who used the mobile app performed significantly better than the control group. Hence, the mobile app had a significant positive effect on students' writing skills.

To measure the perceptions of experimental group students towards the use of mobile app for learning writing skills, a 20-item Student Perception Questionnaire was administered after the intervention. The questionnaire measured four constructs: Perceived Usefulness, Perceived Ease of Use, Attitude Towards Use, and Intention to Use on a 5-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree. The data was collected from all 30 students of the experimental group. Table 3 shows the descriptive statistics for the four constructs.

Table 3

Descriptive Statistics of Student Perception Towards Mobile App N=30

Construct	Mean	SD	Interpretation
Perceived Usefulness	4.330	.58	Very High
Perceived Ease of Use	4.41	0.55	Very High
Attitude Towards Use	4.29	0.64	Very High
Intention to Use	4.21	0.69	Very High

Note: Mean Interpretation Scale: 1.00-1.80=Very Low, 1.81-2.60=Low, 2.61-3.40=Moderate, 3.41-4.20=High, 4.21-5.00=Very High

Table 3 reveals that the experimental group students had a very high positive perception towards the mobile app. The highest mean score was observed for Perceived Ease of Use (M=4.41, SD=0.55), indicating that students found the app very easy and user-friendly. Perceived Usefulness (M=4.33, SD=0.58) was also rated very high, which suggests that students strongly believed the app was beneficial for improving their writing skills. Furthermore, students showed a very positive Attitude Towards Use (M=4.29, SD=0.64) and expressed a strong Intention to Use (M=4.21, SD=0.69) the app in the future. The mean scores for all four constructs were above 4.20, falling in the "Very High" category. This indicates that students not only accepted the mobile app but were also highly satisfied with it and willing to continue using it for learning. The overall results support the quantitative findings of the post-test, confirming that the mobile app was effective and well-received by the students.

Based on the statistical analysis of quantitative data and descriptive analysis of perception data, the following key findings emerged. Initial Equivalence of Groups: The independent samples t-test conducted on pre-test writing scores revealed no statistically significant difference between the experimental group (M=15.47, SD=3.65) and the control group (M=15.07, SD=3.91), $t(58)=1.02$, $p=.313$. This finding confirmed that both groups were homogeneous and equivalent in terms of writing proficiency level at the beginning of the study, thus ensuring a fair comparison for the intervention. Significant Effect of Mobile App Intervention: The independent samples t-test conducted on post-test writing scores indicated a statistically significant difference between the experimental group (M=22.33, SD=3.94) and the control group (M=16.60, SD=4.73), $t(58)=4.89$, $p<.001$. The experimental group significantly outperformed the control group, providing strong empirical evidence that the 8-week mobile app intervention was highly effective in improving ESL writing skills of secondary school students compared to the traditional lecture-

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based method. Magnitude of Improvement: A comparison of mean gain scores revealed that the experimental group achieved a substantial improvement of 6.86 marks, representing a 44.35% increase from pre-test to post-test. In contrast, the control group showed only a marginal improvement of 1.53 marks, representing a 10.15% increase. This large disparity in learning gains further substantiates the effectiveness and superiority of the mobile app intervention over conventional instruction. Highly Positive Student Perception: The descriptive analysis of the Student Perception Questionnaire administered to the experimental group revealed a "Very High" level of positive perception towards the mobile app across all four measured constructs. These results indicate that students not only achieved significantly better learning outcomes but also found the mobile app to be useful, user-friendly, enjoyable, and expressed a strong intention to continue using it in the future.

This study validates the Technology Acceptance Model (TAM) in the Pakistani ESL context, confirming that perceived usefulness and ease of use directly influence students' acceptance of mobile apps for writing. The findings support Social Constructivism, as the app's collaborative features enabled peer learning and scaffolding. Results extend MALL research by providing empirical evidence from a low-resource public school context in Pakistan. Practical Implications for Teachers: Integrate mobile apps as homework or in-class rotational stations to provide personalized writing practice and instant feedback. For Schools: Invest in basic IT infrastructure and train teachers to blend apps with the curriculum rather than viewing them as replacements. For Developers: Design apps with offline functionality, Urdu instructions, and content aligned with the Punjab Textbook Board syllabus to increase adoption.

The study has limitations. Sample Limitation: The study was confined to 60 intermediate level students from one public intermediate college in Mianwali, limiting generalizability to other regions or private colleges. Short Duration: The 8-week intervention may not capture long-term retention of writing skills among intermediate learners. Measurement Scope: The study used a holistic writing rubric and did not separately analyze sub-skills like mechanics, cohesion, or coherence for intermediate level writing. Technical Constraints: Occasional internet connectivity issues and limited device availability affected some intermediate students' practice time. Self-Report Bias: Perception data was self-reported and may be subject to social desirability bias despite anonymity. Overall, the findings of this section provide strong statistical evidence that the mobile app intervention not only significantly enhanced students' writing proficiency but was also well-received and positively perceived by the learners.

Conclusion

This study provides robust empirical evidence that a Duolingo based intervention significantly improves ESL writing skills of intermediate level students in Pakistan. The experimental group not only outperformed the control group with a 44.35% improvement but also demonstrated very high acceptance and positive attitudes towards the technology. The findings confirm that Duolingo can effectively overcome traditional classroom constraints such as large class sizes, limited practice time, and lack of individual feedback in intermediate level ESL classes. The study concludes that mobile-assisted writing instruction is both pedagogically effective and technologically feasible in the Pakistani public intermediate college context. Given students' readiness to adopt technology and the significant learning gains observed, educational stakeholders should prioritize the integration of mobile apps into mainstream ESL pedagogy at the intermediate

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level. This research contributes to the global MALL literature and offers a practical roadmap for technology integration in similar EFL/ESL contexts.

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