

The Impact of Using Mobile Phone Applications on ESL Secondary School Students' Writing Proficiency: A Short Term Study Systems Theory (EST)

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Article Info	Abstract
Article type: Research Article Article history: Received June 30, 2026 Received in revised form August 28, 2026 Accepted September 12, 2026 Published online September 23, 2026 Keywords: Mobile phone applications, ESL learning, Writing proficiency.	This study aimed to examine the impact of using mobile phone applications on improving the writing proficiency of secondary-level students. Writing proficiency is one of the most important areas for English as a Second Language (ESL) learners, with frequent difficulties observed in spelling, grammar, and vocabulary usage. For this study, a quantitative quasi-experimental design was adopted. The number of participants was 25 students, including a control group and an experimental group, each group consisting of 25 students. It was a quantitative study that enabled the variables to be measured using inferential statistics. The study time span was two weeks; thus, a short-term study may be considered a pilot study. The experimental group was given two mobile applications, Grammarly and Improving Writing Skills, after a brief training session, while the control group continued with traditional classroom instruction without technological intervention. Both groups were assessed through pre-tests and post-tests based on paragraph writing tasks, and results were analyzed using a rubric that measured spelling, grammar, and vocabulary. The experimental group showed significant improvements in all three areas of writing, particularly in spelling accuracy, grammatical correctness, and vocabulary building, while the control group showed only minimal progress. These results indicate that mobile applications provide learners with immediate and individualized feedback and enhance traditional classroom instruction. The study concluded that integrating mobile-assisted language learning into ESL classrooms can improve students' writing proficiency, support learner independence, and encourage engagement with the writing process. The findings convey practical implications for teachers, curriculum planners, and policymakers seeking to modernize language learning practices.

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Introduction

English as a Second Language (ESL) refers to learning and using English by people who are non-native speakers of the English language. It happens in places where English is spoken, like schools, workplaces, and social interactions and interpersonal exchanges. Therefore, learning English as a second language helps people to communicate in these particular environments (Richards & Schmidt, 2010). For ESL students, particularly at the secondary school level, the development of writing skills is especially important in the English language learning process. Improving the art of writing is not only an academic activity but also an important life skill that requires time, effort, and regular practice, particularly for people who are learning English as a second language. Writing serves as an essential instrument, providing ESL learners with a wide range of expressions and ideas. Secondary school curricula often include writing to improve students' academic performance across all subjects (Ghosh et al., 2021).

Writing effectively in a global language is not just one of the more challenging parts of learning a second language; it is also one of the most important skills for improving employability and achieving career success. In today's digital world, proficiency in using different technological tools, such as mobile phone applications, has become important for effective communication. After the pandemic, technology has played a significant role in education, particularly in language learning. Writing is an important skill for students at every level of language learning, especially at the secondary level. Using mobile phone applications for writing development and language learning makes it easy for students to understand and implement in their learning process. Using mobile applications alongside traditional learning makes learning more engaging and helps students improve their writing proficiency (Zaki et al., 2024).

Students who use mobile phone applications for academic improvement get more effective results in their performance. Mobile apps help students write better and improve key language skills like grammar, spelling, creativity, composition, and organization in their writing. It also improves their speaking, and their way of explaining changes over time as they learn through multiple sources like online applications and social media apps, with the support of their teachers at school. This encourages them to learn with interest and improve quickly in multiple aspects of language and writing proficiency. Learning on their own also motivates students because of its flexibility (Shavkatovna et al., 2024).

In this study, two mobile phone applications are used for writing proficiency: one is Grammarly, which is partially free to use for this study; the licensed version was used. It provides basic-level feedback that helps secondary-level students. If a student wants to check their own writing passage, such as grammar, vocabulary use, punctuation, spelling mistakes, subject-verb agreement, verb form usage, tenses, and thought connectivity, it helps them use parts of speech correctly. With these suggestions and mistake identification, Grammarly enables students to improve their writing proficiency through self-correction. After using grammar, they do not need to check their write-up; ultimately, they improve their writing day by day at home.

Second, Improve English Writing Skills is an application for learners who are looking to understand writing rules and practice through structured lessons. It is not AI-powered or live feedback, but it helps students improve their writing by studying grammar rules. Students who consistently follow written material and look for authenticity can use this application to apply those rules and achieve better results in writing. This application follows lessons from basic to advanced grammar and word usage; it also includes idioms and phrases for effective writing. This research aims to examine the impact of using mobile applications for writing proficiency, in ESL secondary school students' grammar, spelling, and vocabulary building for writing proficiency. Several Mobile phone applications for writing development provide detailed instructions and interactive exercises to enhance writing proficiency. The research examines how mobile phone applications influence the writing proficiency of ESL Secondary school students. As the intervention period was limited to 2 weeks, this research is not a long-term intervention but rather a short-term feasibility study. The purpose is to explore initial short-term effects of mobile-assisted learning on ESL writing proficiency.

Does the use of mobile applications significantly improve the overall writing proficiency of ESL Secondary school students compared with traditional classroom instruction?

Does the use of mobile applications significantly improve students' vocabulary, spelling, and grammar scores compared with traditional classroom instruction?

Literature review

The Input Hypothesis by Krashen (1985) outlined that language learning takes place when a language learner is presented with comprehensible input that is slightly higher than the learner's level of competence. In this framework, language acquisition does not occur through input that is already known, but through input that is slightly difficult yet understood in meaningful ways. In the case of mobile-assisted writing, for example, with applications like Grammarly, such errors in grammar, sentence structure, and word usage are identified and simultaneously corrected, and subsequently, the learner is given targeted linguistic input that is directly connected to their level of writing development.

Schmidts (1990) noted that the Input Hypothesis adds that learners must notice their mistakes to learn from them; mobile phone applications help with this learning process because applications like Grammarly underline mistakes, whether they are grammatical, punctuation, subject-verb agreement, word usage, sentence structure, or vocabulary correction. These kinds of mistakes grab the student's attention to check what mistakes they made in their writing (Hajizadeh et al., 2023). Another well-known psychologist, Vygotsky (1978), put forth the sociocultural theory, based on the concept of the Zone of Proximal Development (henceforth, ZPD). It highlights the significance of scaffolding in a language learning process. Mobile applications offer learners digital scaffolding to complete independent writing tasks. Piaget (1936) and Bruner (1960) developed the theories of Cognitive Constructivism, which also supported the above-mentioned theories. According to these theories, learners gain knowledge through practice, reflection, and problem-solving. Applications like Grammarly offer learners

the facility to check their writing, receive feedback, and refine their work. This process matches how learning occurs. These theories emerge as a theoretical framework for this research in order to investigate the potential contribution of mobile applications to ESL writing development.

Several studies have highlighted the potential of mobile apps to enhance language skills through various features and functionalities. A systematic review by Ryu and Shin (2021) examined the impact of mobile application features on children's language learning, noting that built-in narration can positively impact story comprehension and word learning for younger children. Another meta-analysis by Shadieff et al. (2022) found a moderate-to-strong overall effect of mobile language applications on second language achievement compared to traditional approaches. However, it also pointed out a high risk of bias and low quality of evidence in the studies. This suggests that while mobile apps show promise, the existing evidence base requires strengthening through more methodologically strong research.

Studies have indicated that technology has motivated students to learn on their own and has led to enhancement of their language proficiency. Warschauer and Healey (1998) proposed that learners tend to lose interest during their study and that motivation and interest were required to keep them in the learning phase, which can be provided through creativity, games, and graphics. In Computer Assisted Language Learning (Henceforth, CALL), the function of the computer changed from that of an instructor or a simple tool to that of a medium, and the more general trend toward technology- and task-based pedagogy was introduced. In addition, Mobile Assisted Language Learning (Henceforth, MALL) can provide advantages for learners, such as feedback, portability, and personalized learning, which can enhance learning time and learner satisfaction.

Ali et al. (2024) examined the integration of mobile learning in English language classrooms at the secondary level in the Pakistani ESL context. They found that the use of mobile-assisted instruction improved students' engagement and language learning, and that the study sought to foster positive attitudes toward MALL among the students with ESL needs. The intervention, however, was targeted mainly at grammar-based content issues like tenses, subject-verb agreement, and language functions and failed to separate writing outcomes as a measurable skill. This is indicative of the general trend of MALL research that writing has not been the primary concern but has been discussed peripherally.

The authors have noted the pedagogical value of mobile devices through the use of apps such as WhatsApp in activating students' engagement in writing (Andujar, 2016). Zaki and Yunus (2015) argued that MALL could be incorporated in academic writing through varied instructional methods, hence endorsing the pedagogical value of mobile devices. There have been positive results in attempts to incorporate mobile applications in academic activities. For example, Alotaibi & Alzu'bi's (2022) quasi-experimental study found that use of Paragraph Punch software improves students' ability to write paragraphs. Also, incorporating mobile applications such as Moodle has been found to improve the performance of ESL students in completing academic tasks.

Zaki and Yunus (2015) stated that MALL can be applied in academic writing by using different teaching and learning methods. In the broader efforts to integrate mobile apps into academic tasks, researchers have had some success, such as Alotaibi and Alzu'bi (2022), whose quasi-experimental study revealed that using the Paragraph Punch software resulted in higher students' paragraph writing ability.

MALL has been identified as a field with the potential to improve writing skills and develop learners' knowledge. Studies have explored the effectiveness of specific mobile applications and platforms in ESL learning. Ebadi and Rahimi (2019) found that learners were better able to compose complex sentences through MALL. The interactive and multi-modal features of mobile applications can also lead to enhanced learning opportunities, allowing students to share and negotiate ideas using English and other resources such as images and videos.

Additionally, there are positive findings on the effects of MALL on student motivation. The results of this study indicated that the use of mobile gadgets and mobile applications in the classroom had high acceptance and positive attitudes from the respondents, thus affecting their attitude in learning the language. The findings of Costa and Han (2017) indicated that the respondents were appreciative and had a positive attitude towards the application of mobile gadgets and applications in the classroom, which consequently had a positive impact on their attitude in learning the language. Al-Shehab (2020) identifies the new paradigm of writing pedagogy: mobile devices contribute to the students' autonomy and agency, and the tasks are not strictly monitored. Gonulal (2019) suggested that English language learners could use social media apps like Instagram to enhance their language skills, such as writing.

Ebadi and Bashir (2021) conducted a mixed-methods study that examined the effect of mobile-based dynamic assessment on EFL learners' writing skills in two experimental and one control group, comprising 30 intermediate-level EFL learners. The students did writing assignments using the Google Docs mobile app, and the teacher gave feedback through text and voice on WhatsApp and Google Docs. The results showed that this dynamic assessment through mobile devices had a significant effect on the written proficiency of learners, which means that the experimental group did better when compared to the control group. The research also demonstrated that the use of mobile tools together with the instructor's feedback enabled a more effective environment for writing development than the traditional classroom.

Mobile applications have long been used in English as a Foreign Language (EFL), with a particular focus on enhancing writing skills. Apps such as Grammarly, Duolingo, and Google Docs are perceived as resources to assist learners in spelling, grammar, punctuation, and structuring their thoughts. For instance, tools like Grammarly integrate additional features in their algorithms to instantaneously detect and correct spelling and grammar, thus enhancing students' perception of their writing skills. Research indicates that learners who regularly used such resources possessed a lower error rate and overall higher disposition to complete their set paragraph writing at a proficient level (Ranalli, 2018).

Recent research has pointed to the effectiveness of MALL as a language instruction intervention to address weak writing mechanics. In particular, Alshammry (2025) revealed significant improvements in grammatical accuracy and spelling of EFL learners who used mobile apps, indicating that mobile technology can support formal language rules outside of the classroom. In recent years, Muhammad et al. (2025) performed a quantitative experimental study with 120 secondary school students in Pakistan, half of whom were given the experimental treatment and the other half served as the control group. The experimental group used mobile applications that aligned with their ESL curriculum for 8 weeks, while the control group was instructed using the traditional teaching method. All four language skills—reading, writing, listening, and speaking were tested at the pre-test and post-test stages, and the results showed that the experimental group had significant improvement in all four skills. Of note, however, was that mobile application use was only mildly correlated with individual improvement, indicating that the quality and purposefulness of interaction with mobile tools are more important than simply the number of such tools used. This study has provided support by providing evidence of the effectiveness of mobile applications for secondary-level education in Pakistan, but writing was measured as a part of a combined four-skill score, which was not analytically assessed.

Shahid (2026) analyzed the impact of Grammarly on the writing skills of students in grades 9th and 10th of the Sunbeams School System through a case study in a secondary school in Pakistan. The study used a quasi-experimental one-group pre-test/post-test design with 30 participants for a period of one month to find that the average score of the participants in writing tasks on paragraphs was significantly improved from 4.6 to 7.8 out of 10 after being taught by Grammarly. The researchers found that adopting Grammarly in conjunction with teacher feedback, and not as a replacement for it, was most effective. A major methodological limitation, however, is that there was no control group, which makes it impossible to draw any definite conclusions about whether or not the observed gains were due to the Grammarly intervention itself or to maturation or practice effects or to teacher instruction. Additionally, the participants were a small group of students who were all using one specific AI grammar-checking tool, and the study did not examine the effects of other tools. Moreover, the study was limited to a single AI grammar-checking tool, and the small sample size of the students makes the findings difficult to generalize.

These benefits are also confirmed through the experiences of students. Fatima et al.,(2025), who conducted a survey on a 30-item Likert scale with 400 secondary school students from the Lahore district, found that learners perceived the use of smartphones as very useful in the L2 learning process, where they actively engaged with the English language learning process and facilitated and enriched the learners' language acquisition. The results of an independent t-test showed that there was no significant difference between the secondary school male and female learners' perceptions of the motivational value and assistive value of using the smartphone, indicating that both these perceptions were generally shared by both genders at the secondary level. The results are in line with previous studies that have stressed the importance of using

mobile tools to maintain students' motivation and facilitate self-study of language outside the classroom.

Along with the benefits of using mobile phone applications, there are also challenges with them. One of the most common challenges is over-dependency on the application; learners might rely on auto-correction and suggestions instead of learning language rules. Sometimes this reliance makes it harder for learners to remember grammar, spelling, and vocabulary use, which can affect their long-term learning (Rimbar, 2017). For instance, evaluating the affordances and limitations of a mobile phone and computer application, Hajizadeh et al. (2023) found that Mondly had the potential to enhance language learning while highlighting the drawbacks.

Digital inequality is another challenge, as Stockwell & Hubbard (2013) noted: the number of students who do not have mobile phones and good Internet connections, or sometimes they don't have the skills to use these tools effectively; this lack of access differentiates the learning outcomes, particularly in those schools where the resources are already limited. Another challenge is unfocused learning where students quickly accept suggestions and auto-correction; this may cause the repetition of mistakes in their new writing assessments (Bitchener & Storch, 2016). While these applications are very useful for learning and fixing grammatical mistakes and spelling errors, sometimes they cannot help at a higher level of writing proficiency, such as argument and organization of ideas or maintaining coherence (Hyland & Hyland, 2019). The reviewed studies above show that mobile apps hold great potential in enhancing a wide range of ESL writing development areas, such as grammar accuracy, vocabulary acquisition, sentence construction, and motivation. But there are several unanswered questions. Ali et al. (2024) and Muhammad et al. (2025) were both conducted in secondary schools in Pakistan, but neither of these studies measured writing as a major criterion; the first one measured a grammar-based content domain, while the second one measured writing in the context of a combined four-skills score.

The most relevant study to writing proficiency of secondary-level Pakistani students is Shahid (2026), but it is flawed due to the lack of a control group, a small sample of 30 participants, and the limited scope of using only one AI tool. In a similar manner, although Alshammry (2025) offers evidence for student gains in writing that is quite convincing from his research, the research environment was in Saudi Arabia, and the results were not applicable to the Pakistani ESL context. Moreover, the only existing study in this context was done at the secondary level by Shahid (2026) in Karachi, which did not have a control group; and no controlled experimental study in this context was found on mobile applications and ESL writing proficiency at the secondary level. The present study thus aimed to fill the above gaps by using a pre-test/post-test experimental design with experimental and control groups of 25 secondary school students from one school in Karachi, Sindh, to investigate the specific impact of mobile phone applications on ESL writing proficiency.

Method

Design

In this study, the quasi-experimental design was adopted to investigate the impact of mobile phone applications (Grammarly and Improve English Writing Skills) on the writing proficiency of secondary-level ESL learners. The study was designed to check the improvements in spelling, grammar, and vocabulary in both groups before and after the tests.

A convenience sampling technique was used to select participants from intact class for conducting the quasi-experimental study. This is an intact cluster sampling design in a quasi-experimental design, where intact class groups were used in the study instead of students being randomly assigned to each group. A total of 50 students were selected and divided into two groups: students from grade 10 were selected as the control group ($n = 25$) (no mobile application intervention), and as the experimental group ($n = 25$) (intervention with mobile applications). Tests were conducted in the morning time from 9 am to 10 am during the English period.

Before the main experiment, a one-week pilot study was conducted with a small group of students who were not part of the final sample. The pilot study was conducted with the same class; the purpose was to check if the students were capable of using the app for writing proficiency; otherwise, the app could possibly be changed if they didn't comprehend the usage of this app. The group that participated in the pilot study did not participate in the main study, so that all the participants could engage in the same time span for the study.

Participants

The participants of this study consisted of secondary school students enrolled in Grade 10 at a private boys' school in Karachi, Sindh, Pakistan, following the Matriculation (Matric) system of education. All participants were Pakistani nationals and male, aged between 15 and 17 years, studying English as a compulsory subject. The selection criteria required that students had no prior experience using the Grammarly or Improve English Writing Skills applications and that they were present for both the pre-test and post-test sessions.

Instruments

The pre-test was conducted before the intervention. Students were asked to write a paragraph on given topics, as mentioned above in the data collection procedure. It was designed to evaluate the baseline of students' writing proficiency. The same procedure was repeated after the two-week intervention. Students were asked to write a paragraph consisting of 100-150 words to evaluate their improvement after using mobile phone applications.

Procedure

The data were collected over a period of two weeks. In the first week, both groups took the pre-test; they were assigned to write a 100- 150-word paragraph on selected topics such as "My Favorite Teacher", "Visiting My Favorite Place", "My Favorite Book," and a few others. Then, for the next two weeks, the experimental group used the mobile phone applications for writing

improvement, focusing on spelling accuracy, grammar, and vocabulary building, while the control group continued their usual classes. Both tests were collected physically, and the students were monitored throughout the intervention period for validity. In the final week, both groups took the post-test. All the paragraphs were handwritten.

It is important to clarify the writing modality used in this study. During the intervention, the experimental group typed their paragraphs so they could be submitted to Grammarly for feedback, since the application requires digital text to identify errors. However, both the pre-test and post-test were kept handwritten and completed without access to any digital tool. This design was intentional: the handwritten test was used to determine whether students had internalized the corrective feedback and language rules from the applications, rather than measuring their performance while still assisted by the tool. In other words, the handwritten post-test served as a transfer measure, testing whether learning gained through digital feedback carried over into unassisted, real-world writing conditions.

In this study, the experimental group used two mobile applications, “Grammarly” and “Improve English Writing Skills,” and the control group received traditional instruction from their teachers, which comprised explanations of grammar, vocabulary exercises, writing practice, and written or verbal feedback on their writing. The experimental group used two applications that served different functions. Grammarly: An online application that automatically gave feedback on submitted paragraphs by underlining errors in multiple colors based on the type of error, showing percentage of accuracy, vocabulary level, and suggestions for corrections. Improve English Writing Skills was an offline application that did not require internet connectivity and served as a structured course made up of 13 step-by-step lessons that addressed students’ writing abilities from beginner to advanced levels. Students were given short training before the intervention started to use both applications. During the intervention, participants wrote paragraphs on the same topics used in the pre-test, submitted them to Grammarly for feedback, and were instructed to record their errors in order to learn from them.

At the same time, they were engaged in activities on the Improve English Writing Skills application. To ensure validity and reliability, daily progress was monitored, and assessed students’ written work during the intervention. Both groups then took a post-test after the two weeks on a similar paragraph writing task to the pre-test. The three writing domains vocabulary, spelling, and grammar were scored on the basis of deduction, with paragraphs from both the control group and the experimental group being scored. All domains started at a 100% mark and each error noted whether it was a vocabulary word or misspelled word, or a grammar error. Such as verb tense, subject-verb agreement, and sentence structure, deducted points from this score. The final percentage for each domain was based on the number of errors and the severity of errors based on the length of the paragraph. All pre-test and post-test paragraphs of both groups were initially scored by manual scoring technique by the researcher. Since it is difficult to identify all the errors in a large number of students' writings by hand, all the scores were also independently checked with Grammarly software, applied equally to the paragraphs of each group to detect errors without considering whether they were from the control or experimental

group. When there was a discrepancy between the manual score and the software-assisted check, the paragraph was checked again to finalise the score. The reliability check for the scoring procedure was conducted by humans, followed by software verification in a two-step process.

Data analysis

Primarily, the data of both the Experimental and Control groups were analyzed using descriptive statistical analysis in IBM SPSS (Version 27). Moving from descriptive to inferential statistics, in order to check the baseline equality, independent-samples t-tests were conducted. The T-Tests were followed by separate ANCOVAs for vocabulary, spelling, and grammar. For each ANCOVA, the pre-test score was a covariate, and the post-test score was a dependent variable (DV), while the group was the fixed factor. The mean differences, 95% confidence intervals, exact F Statistics, p-values, and partial eta squared have been examined. For a robust check, a 2×2 group-by-time analysis was calculated.

Table 1

Pre-test and Post-test Means and Standard Deviations by Domain and Group

Domain	Group	Pre M (SD)	Post M (SD)	N	Post-test 95% CI
Vocabulary	Control	51.44 (22.29)	56.04 (20.40)	25	47.62–64.46
Vocabulary	Experimental	52.16 (22.97)	63.40 (22.63)	25	54.06–72.74
Spelling	Control	50.48 (21.24)	55.08 (19.57)	25	47.00–63.16
Spelling	Experimental	51.32 (22.08)	67.12 (20.31)	25	58.74–75.50
Grammar	Control	49.36 (19.87)	53.96 (18.50)	25	46.32–62.60
Grammar	Experimental	52.36 (19.90)	63.84 (20.82)	25	55.25–72.43

Note. M = mean; SD = standard deviation; CI = confidence interval; N = number of participants per group.

Findings

The study was conducted to check if mobile applications like “Grammarly” and “Improving Writing Skills” improve the English writing proficiency of the ESL students. In order to examine the statistically significant differences, continuous pre-test and post-test scores were analyzed through inferential statistics.

As this study was a quasi-experimental study, the researchers first examined baseline differences between the control and experimental groups. The independent-samples t-test showed that there were no statistically significant differences between the two groups at pre-

test for vocabulary, $t(48)=-0.112$, $p=.911$; spelling, $t(48)=-0.137$, $p=.892$; and grammar, $t(48)=-0.533$, $p=.596$. These statistics indicate that the two groups were statistically comparable at baseline on the three writing domains being assessed. The pre-test to post-test of the significant Group $\times$ Time interactions inferred that the amount of change differed significantly between control and experimental groups in all three domains.

The experimental group demonstrated an increase from pre-test to post-test across all the domains. The raw continuous percentage scores show that the group was broadly comparable at baseline for vocabulary, spelling, and grammar were analyzed in order to address the loss of categorical binning.

Table 2

Independent Samples t-Test Results for Baseline (Pre-test) Scores

Domain	t (df = 48)	p
Vocabulary	-0.112	.911
Spelling	-0.137	.892
Grammar	-0.533	.596

According to independent-samples t tests, there were no significant pre-test differences for vocabulary, $t(48)=-112$, $p=-0.112$, $p=0.911$; spelling, $t(48)=-0.137$, $p=0.892$; grammar, $t(48)=-0.596$.

Table 3

Baseline Equality Between Experimental and Control Groups

Domain	t (df = 48)	p	Experimental–Control Baseline Mean Difference
Vocabulary	-0.112	.911	0.72
Spelling	-0.137	.892	0.84
Grammar	-0.533	.596	3.00

Note. All baseline comparisons were non-significant ($p > .05$), indicating no evidence of per-intervention differences between groups.

Furthermore, a 2×2 mixed Group $\times$ Time analysis was applied for robustness check. The amount of change from pre-test to post-test differed significantly between the experimental and control groups across all three domains. The Group $\times$ Time interaction was statistically significant for vocabulary, $F(1,48)=6.679$, $p=.0129$, partial

$\eta^2=.122$;spelling, $F(1,48)=16.556,p<.001$,partial
grammar, $F(1,48)=5.474,p=.0235$,partial $\eta^2=.102$.

$\eta^2=.257$;and

Table 4

Group $\times$ Time Interaction Effects (2 $\times$ 2 Mixed ANOVA Robustness Check)

Domain	F (df1, df2)	p	Partial η^2	Effect Size Interpretation
Vocabulary	$F(1, 48) = 6.679$	.0129	.122	Medium to large
Spelling	$F(1, 48) = 16.556$	<.001	.257	Large
Grammar	$F(1, 48) = 5.474$	.0235	.102	Medium

To conclude, the findings for RQ1 show that mobile-phone applications like Grammarly and Improving Writing Skills, which were used for intervention, resulted in significantly greater short-term improvement in ESL writing proficiency compared with traditional classroom instruction. Since it was a short-term study and the intervention period was short accordingly, and the participants were drawn from intact classes, these findings should serve as evidence of a short-term intervention effect, rather than evidence of sustained or long-term writing skills development.

Before conducting ANCOVA, a test of the homogeneity of regression slopes assumption was calculated (see Table 5). This test was conducted to determine the relationship between covariates (pre-test scores) and dependent variables(post-test scores). It was consistent between the experimental and control groups. This assumption calculated the evaluation of the interaction between groups and pre-test scores for each writing domain. It found that the interaction for vocabulary $F(1,46)=0.225,p=.638$,spelling, $F(1,46)=0.183,p=.671$ and grammar $F(1,46)=0.000,p=.999$. The results across the three domains showed that the relationship between the covariate and the dependent variable was similar across the groups. Therefore, the assumption of homogeneity of regression slopes was met, supporting the use of ANCOVA.

Table 5

Test of Homogeneity of Regression Slopes Assumption

Writing Domain	Interaction Term	F (df1, df2)	p
Vocabulary	Group $\times$ Pre-test	$F(1, 46) = 0.225$	.638
Spelling	Group $\times$ Pre-test	$F(1, 46) = 0.183$	.671
Grammar	Group $\times$ Pre-test	$F(1, 46) = 0.000$	.999

Note. Non-significant interaction terms across all domains confirm that the assumption of homogeneity of regression slopes was met, supporting the appropriateness of ANCOVA.

After adjustment (see Table 6), the corresponding pre-test score and group membership were significant predictors of post-test performance in all the domains: vocabulary, spelling, and grammar. It was observed that the largest adjusted effect was observed for spelling, followed by vocabulary and grammar.

Table 6
Results for Post-test Scores Controlling for Pre-test Scores

Domain	Adj. Control M	Adj. Exp. M	Mean Diff.	95% CI	F (1, 47)	p	Partial η^2
Vocabulary	56.35	63.09	6.73	1.78, 11.68	7.477	.0088	.137
Spelling	55.43	66.77	11.35	6.20, 16.49	19.700	<.001	.295
Grammar	55.24	62.56	7.32	1.56, 13.08	6.540	.0138	.122

Note. Adj. M = adjusted mean, controlling for pre-test scores as a covariate. CI = confidence interval for the adjusted mean difference.

For further analyses, we looked for covariance (Table 7); the post-test scores were adopted as the dependent variables, the group conditions were adopted as the independent variable, and the corresponding pre-test score as the covariate. The results showed statistically significant adjusted group differences across all three assessed writing domains. The vocabulary analysis showed a significant effect of group, $F(1,47)=7.477$, $p=.0088$, partial $\eta^2=.137$. The spelling analysis produced a stronger group effect, $F(1, 47)=19.700$, $p < .001$, partial $\eta^2=.295$. Grammar showed a statistically significant group effect, $F(1,47)=6.540$, $p=.0138$, partial $\eta^2=.122$.

Table 7
Partial η^2 Square Effect Size Effect Sizes for Group Differences by Writing Domain

Domain	F (1, 47)	P	Partial η^2	Adj. Mean Diff.	95% CI
Vocabulary	7.477	.0088	.137	6.73	1.78, 11.68
Spelling	19.700	<.001	.295	11.35	6.20, 16.49
Grammar	6.540	.0138	.122	7.32	1.56, 13.08

Moreover, the adjusted post-test means further demonstrated that the experimental group performed better than the control group after controlling for pre-test performance. The adjusted experimental-group score was 6.73 points higher than the control group for vocabulary, 11.35

points higher for spelling, and 7.32 points higher for grammar. The corresponding confidence intervals for the adjusted group differences excluded zero. These results provide inferential evidence that students who received the mobile-application intervention demonstrated greater short-term improvement in the assessed components of writing proficiency than students who received traditional classroom instruction.

ANCOVA was used separately to examine vocabulary, spelling, and grammar. For vocabulary, the experimental group demonstrated a statistically significant adjusted advantage over the control group, $F(1,47)=7.477, p=.0088$, partial $\eta^2=.137$. It demonstrates that, after accounting for students' pre-test vocabulary scores, the experimental group achieved significantly higher post-test vocabulary performance.

The findings for spelling were examined as follows: the difference between the groups was statistically significant and larger comparatively. This was the largest intervention effect among the three writing domains. $F(1,47)=19.700, p<.001$, partial $\eta^2=.295$. The adjusted experimental group score was 11.35 points higher than the control group. For spelling, the difference between the groups was statistically significant and comparatively large, $F(1, 47) = 19.700, p < .001$, partial $\eta^2 = .295$.

The last domain was Grammar, which showed a statistically significant adjusted group difference, $F(1,47)=6.540, p=.0138$, partial $\eta^2=.122$. The experimental group had an adjusted advantage of 7.32 points over the control group. This calculation indicated that the mobile-application intervention of Grammarly and Improving Writing Skills was associated with significant short-term improvements in vocabulary, spelling, and grammar.

Discussion

This study aimed to examine the impact of mobile phone applications on the writing proficiency of secondary-level ESL learners, focusing on vocabulary, spelling, and grammatical accuracy. The applications used during the intervention were "Grammarly" and "Improving Writing Skills", the former was online, while the later was offline. The performance of participants in the experimental group was compared to the control group through inferential studies using SPSS version 27. The inferential statistics results showed that the experimental group showed significant progress in all three areas of writing, while the control group demonstrated only minor improvements in the pre-test and post-test results. After controlling for pre-test performance. There was a statistically significant post-test difference between the two groups, inferred from the ANCOVA results. But the mixed-design ANOVA revealed that the magnitude of change across time differed significantly; both results strengthen the evidence that mobile-assisted writing instruction improves proficiency, despite acknowledging that this study intervention lasted for a brief period.

A systematic review and a meta-analysis conducted by Garzon et al. (2023, 2025) advocated the efficacy of MALL in pedagogy and second language acquisition; this aligns with the results achieved in the current studies. It may provide learning material, individualized

feedback, and autonomy in learning. However, it is also a noteworthy point that Garzon et al(2025) raised: long-term mobile assistance for learning cannot be ascertained, depending upon the environment. Therefore, a total reliance on MALL may not be plausible. And when compared to this study, which is a short-term study, the higher effect of learning is unlikely to occur.

This study carried out ANCOVA and it indicated a statistically significant advantage for the experimental group as it improved the vocabulary markedly. This result could be compared and supported by the Zhou & Zhou (2026) quasi-experimental study result which suggest that mobile applications give access to revisits to new or unfamiliarized vocabulary for several times so that vocabulary becomes personalized at learning. The study further supports the stance and this short-term study that due to a technology-driven environment students get exposure to repeated lexical items, contextualized practice and chances of review and retrieval of the vocabulary.

Since this study tried to assess three domains of writing proficiency but the spellings demonstrated the strongest effect of intervention (partial $\eta^2=.295$) showing considerable educational effect, the research. The research highlighted errors in spellings and provided alternatives for corrections. This enabled the learners to engage in multiple cycling of noticing, correction and reinforcement. Studies conducted prior to this also suggest that the digital writing applications effectively support lower-order writing skills as these skills are highly responsive to immediate corrective feedback.(Xu & Warschauer,2023)

Also, the mixed-design ANOVA results support the interpretation of the intervention effects. Significant Group $\times$ Time interactions were demonstrated for vocabulary, grammar, and spellings. This explained that the experimental group showed a significantly improved scale than the control group. These interaction effects conclude that the observed gains do not contribute to traditional or routine classroom learning or repeated testing.

We will now discuss the conducted research in context of the theoretical framework applied for this research. The improvements can further be explained through established second language acquisition theories. According to Krashen's Input Hypothesis (1985), learners improve when they have access to language that is both understandable as well as a little bit beyond their current proficiency level. This is what the mobile applications provided by correcting students' errors and providing them with improved sentence structures. According to Schmidt's Noticing Hypothesis (1990), learners start learning a language when they become aware of their knowledge gaps. The applications helped in this process by bringing attention to spelling, grammatical, and vocabulary mistakes, making students focus on their areas of weakness. According to Constructivism, students actively improved their skills by using the apps to practice, edit, and revise their own work instead of just accepting corrections by suggestions. Vygotsky's Sociocultural Theory (1978) can also be linked to the findings of this study, which explains learning through the concept of the Zone of Proximal Development

(ZPD). Mobile applications employed digital scaffolding, assisting learners while completing activities until they were capable of writing on their own.

These findings align with earlier work that has stressed the advantages of mobile app learning. Zalani et al. (2024) determined that mobile-based writing instruction resulted in advantages toward learner performance, Alharbi and Alshammari (2021) found that mobile applications focusing on grammar resulted in marked improvement in learners' grammatical accuracy. The vocabulary growth in this study also corroborates the work of Ebadi and Rahimi (2019) and Costa and Han (2017), who found that mobile learning increases word exposure and learner motivation. Ali et al. (2024) similarly reported that mobile learning positively influenced English language outcomes in Pakistani classrooms, reinforcing the relevance of mobile-assisted approaches in this specific context. More recently, Shahid (2026) conducted a case study at the secondary school level in Pakistan and demonstrated that Grammarly contributed to writing proficiency gains among Grade 9 and 10 students, a finding that directly supports the results of the present study. The more modest improvement in spelling, on the other hand, supports Rimbar's (2017) position that students who are not given intensive instruction and practice beyond automated correction often repeat spelling mistakes.

The control group made only minor progress overall, which indicates the weaknesses of traditional classroom instruction. Feedback in traditional classrooms is often slow and not provided to each student individually, unlike the immediate feedback provided by mobile applications. This kind of feedback makes students learn more on their own. It may affect their focus and attention because mobile phones have multiple applications in which students get notifications and messages at the same time, which may cause distraction. While guidance from teachers and peers is helpful, it does not reach the same level of individual attention as technology-based support.

It has been widely accepted in research that the mobile applications have significantly improved the ESL proficiency including the instant grammar, spelling, and vocabulary feedback, such as that provided by Grammarly, which assists learners in correcting errors. These applications promote learning and practice at any time and place. Chang and Yang (2015) noted that with online feedback, students get engagement especially in bigger classes where personalized responses are scarce. Heil et al. (2016) suggested that mobile tools reinforce self-study and offer learners the opportunity to practice beyond the classroom, fostering learners' self-efficacy and self-direction. The ability to learn offline, unlike the limited conventional classroom, increases flexibility for learning in everyday activities (Kukulska-Hulme & Shield, 2008).

Over-dependence on applications can affect the memory of language rules (Rimbar, 2017). Digital inequality affects students, as without access to technology or the necessary skills, it creates differences in learning outcomes (Stockwell & Hubbard, 2013). Additionally, unfocused learning from auto-corrections may keep errors in writing assessments, and some applications struggle with higher writing proficiency, like argument and coherence (Godwin-Jones, 2017).

These outcomes are crucial for educators. Mobile applications are important aids in the teaching of ESL writing. Students using Grammarly enjoy the privilege of instant feedback, which allows instructors to concentrate on teaching higher-order writing skills. Smartphone applications motivate students to actively participate in the process of writing and not passively wait for corrections. In ESL classrooms with very limited individual attention, mobile learning tools provide an inexpensive, easy, and practical solution to improving writing skills.

Conclusion

The short term study investigated the impact of mobile phone applications, namely Grammarly and Improve English Writing Skills, on the writing proficiency of ESL Secondary school students. The results underwent inferential analyses that showed that those learners who participated in the mobile-assisted intervention performed significantly better than the fellows in the control group. The vocabulary, spelling, and grammar measures after controlling for baseline performance. In the later stage, the ANCOVA findings revealed that there were statistically significant effects in all three domains, with moderate effect sizes. These results show that the mobile applications can be used as effective instructional supplements for improving a particular skill of writing proficiency in an ESL context.

The inferential findings support the study from the theoretical perspectives of the study in connection with the technology-enhanced language learning framework, which posits that digital learning tools promote language development through immediate feedback, repeated practice, self-paced and regulated learning, and learner autonomy. The findings have further reinforced the sociocognitive perspectives of second language acquisition by showing how technology-mediated interaction and feedback for corrections could improve and facilitate linguistic skills. This study adds to the body of literature regarding MALL by demonstrating that it is effective at the secondary school level. It also identifies certain issues, such as reliance on auto-correcting programs, unequal access to MALL, and the limited capacity of the tools to deal with more complex writing abilities like coherence and organization. Mobile apps have proven to be effective in enhancing ESL learners' writing skills, specifically in vocabulary and grammar and, to some extent, spelling.

The study was conducted with a small number of students from one secondary institution, and the findings may not be applicable to the general population of secondary students. The intervention period lasted only two weeks, which might not have been enough to show the effect of MALL. In addition, the research examined only three areas of writing: vocabulary, spelling, and grammar, and did not explore other important areas of writing, such as composition, idea development, critical thinking, essay writing, and creative writing. Lastly, the study focused exclusively on quantitative pre-test and post-test data, with student reflections, interviews, or teacher observations being qualitative data that could have added depth to the study of students' experiences and perceptions. Similarly, the mixed-methods approach would have further strengthened and triangulated the research, making it more reliable in its stance on the importance and role of MALL in utilizing it for writing proficiency. Moreover, a single rubric

was used by the researcher, and no multiple score raters were used; therefore, no Cohen's K or intraclass correlation coefficient was applied. If multiple score raters were used, the results would be more valid in research; therefore, it may be considered a limitation of this study and may be taken up in future research.

Teachers should use these mobile phone applications, like Grammarly and Improving Writing Skills, which provide personalized feedback to the students, while also helping them work on more advanced writing skills. Students are suggested to use these applications to know their mistakes and improve their grammar, vocabulary, and spelling. They should see these tools as helpful learning partners. Schools and policymakers should help more students with access of MALL by providing devices, ensuring good internet connectivity, and offering training to the teachers and students, especially in areas with lack of resources. Researchers should look into how mobile apps affect students over time, try different tools, and use qualitative methods for better understanding advanced writing skills. This is a short-term study, whereas writing proficiency is a cognitive ability that requires at least twelve weeks time, therefore, this study may be taken as a pilot study, and the researchers can further build on this study for future research.

Bio-data

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