RESEARCH PAPER

Effectiveness of Online Applications in Developing English Writing Skills: A Study through Transactional Distance Theory and Asynchronous Learning

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Abstract
Virtual learning has been brought to the forefront of higher education by advanced educational technologies offering interactive and flexible solutions for skill development. It provides innovative ways to master complex competencies like writing, surpassing the limits of traditional classrooms in language education. This study investigates the effectiveness of selected online applications in enhancing undergraduate students' English writing skills through the application of Moore's Transactional Distance Theory (TDT) and asynchronous virtual learning approaches. The research integrates 24 carefully designed writing activities across diverse genres, including paragraphs, formal letters, advertisements, and grammar-based exercises recognizing writing as one of the most challenging language competencies requiring grammatical accuracy, lexical range, organization, and creativity. A total of 452 undergraduate students from various academic streams such as BBA, BBA Aviation, B. Com, BCA, and BHM participated in a mixed-method research design comprising pre- and post-tests, structured feedback forms, and semi-structured interviews. The semi-structure interviews' responses were voice-recorded in mp4 format and later speech-transcribed using **Vosk Audio Transcription** speech recognition toolkit on Windows for accurate thematic analysis. Additionally, AI-generated feedback was provided for every descriptive question in both pre- and post-tests, enabling participants to identify and address individual writing weaknesses through iterative revision. A quantitative analysis using paired-sample t-tests revealing a statistically significant improvement in post-test scores compared to pre-test results ($p < 0.001$). The findings suggest that combining TDT-based instructional design supported by AI-driven feedback and transcribed qualitative insight with asynchronous learning flexibility fosters substantial improvements in writing proficiency, learner engagement, and autonomous skill development. The study provides evidence-based recommendations for integrating virtual writing applications into higher education curricula, particularly in multilingual settings where English serves as a medium for academic and professional communication.

Keywords: English writing skills, asynchronous learning, Transactional Distance Theory, virtual learning, online applications, higher education, AI feedback, speech transcription

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Introduction

A paradigm shift from traditional, face-to-face learning environments to more flexible and interactive virtual learning ecosystems has taken place due to the rapid advancement of technology in higher education. In language education, this transformation has been particularly influential, wherein online platforms and digital tools offer extraordinary opportunities for skill improvement (Almusharraf & Khahro, 2020). Lecturers generally hold favourable attitudes toward online teaching-learning platforms and consider them adaptable to diverse teaching styles, with a significant relationship observed between teachers' attitudes, readiness, and the sustainability of such platforms are indicated by studies conducted in different higher education contexts (Joseph et al., 2026). Learner engagement, revision frequency, and overall writing quality in higher education have been increased due to technology-enhanced writing environments (Zhang & Hyland, 2018). Writing remains one of the most challenging competencies to develop among the four pillars of language learning; Listening, Speaking, Reading, and Writing, as it demands not only lexical precision and grammatical accuracy but also organization, creativity and critical thinking (Hyland, 2019). While developing complex writing skills such as coherence, argumentation, and audience awareness, digital scaffolding tools can support learners in managing cognitive load (Hyland, 2019). In this regard, the writing skills of English have become an essential academic and professional asset, especially for the aspirants getting prepared to enter global job markets wherein effective writing skill is imperative. The asynchronous, personalised and interactive platforms for skill development are offered by the integration of virtual learning into writing instruction which allows academicians to transcend the limitation of physical classrooms. The learners are enabled to engage with instructional materials, complete activities and interact with their peers or instructors at different times rather than in real time with the help of virtual education's key feature asynchronous learning (Hrastinski, 2019). This

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flexibility has provided the opportunities to revisit content as needed, and balance academic requirements with other commitments and allows students to work at their own pace. When students balance academic and personal responsibilities, flexible asynchronous models are particularly beneficial in the given contexts (Garrison et al., 2010).

Studies indicate that there's improvement in metacognitive awareness and self-regulated learning when we have repeated access to instructional materials in asynchronous settings (Anderson, 2020). Asynchronous approaches offer extended time for revising, drafting, and reflecting on the written work i.e. critical processes in developing higher order writing skills for language learning. It also boosts the learners to foster independent thinking and sustained engagement with tasks and take ownership of their learning trajectory (Anderson, 2020). In the present study, while still maintaining structured learning objectives, asynchronous delivery was integral to the activity design, ensuring that all 24 writing activities could be attempted, accessed, and resubmitted within flexible timelines. The instructional model sought to balance learner autonomy with guided support by combining asynchronous flexibility with targeted feedback mechanisms. Deeper reflection and self-paced writing development are promoted by asynchronous learning environments, particularly when accompanied by structured guidance and feedback (Garrison et al., 2010).

The present study is grounded in Moore's Transactional Distance Theory (TDT), a framework which is widely recognized for its applicability in distance education. The theory identifies three interdependent components: Dialogue, Structure, and Learner Autonomy as essential in minimizing the psychological and communication gap between facilitator and learner (Moore, 2018). There is a significant enhancement in learner comprehension and performance in online writing tasks when transactional distance is reduced through structured dialogue and scaffold activities (Swan, 2001).

Dialogue refers to purposeful, beneficial exchanges between the facilitator and the student or among peers, crucial for clarifying expectations, offering feedback, and sustaining motivation. In this research, while ensuring the channels for both peer-to-peer and facilitator-student interaction without disturbing the self-directed nature of the writing activities, the component-dialogue was facilitated through embedded interaction opportunities within the activity design as well as other platforms such as WhatsApp Groups and email. A positive influence in writing motivation, clarity of ideas, and revision quality has been found by sustained online dialogue between teachers and peers (Hrastinski, 2019). WhatsApp and email; Supplementary digital communication channels help maintain instructional dialogue and reduce transactional distance in asynchronous learning (Hrastinski, 2019).

Structure refers to the degree of course organization, clarity of learning objectives, and predetermined instructional pathways. The study implemented 24 systematically designed writing activities using selected online applications, each with explicit objectives, scoring rubrics, and progressive complexity from basic to advanced writing tasks. This component maintained clear consistency between the learning objectives, practice opportunities, and assessment criteria. In online learning, well-designed instructional structure improves task completion rates and writing outcomes and reduces learner uncertainty (Anderson, 2020).

Learner Autonomy refers to the ability of the learners to take accountability for their learning by making decisions with regard to pacing, focus areas, and strategies. The asynchronous design of the activities in this study enabled learners to manage their own schedules, choose practice tasks within the given framework, and monitor their progress independently. This autonomy was reinforced through AI-generated feedback for every descriptive response in both pre- and post-tests after the experiment enabling students to identify and address weaknesses independently after the experiment. Additionally, qualitative insights were captured through semi-structured interviews; voice-recorded and later transcribed using Vosk Audio Transcription for precise thematic analysis. This ensured that both quantitative performance data and rich, learner-expressed experiences informed the study's findings. Research shows that greater persistence, self-reflection, and strategic revision in digital writing environments are demonstrated by autonomous learners (Kukulska-Hulme & Shield, 2008).

There are fewer studies that have examined the application of TDT in virtual writing instruction, particularly in the South Asian higher education context while research in the last decade has explored the role of technology in language learning (Ali, 2021; Su & Zou, 2022). Moreover, there are only limited empirical studies integrating quantitative pre- and post-test performance data with qualitative feedback, AI-driven analytics, and transcribed learner reflections. The need for mixed-methods research that integrates performance data with learner perceptions in digital writing studies is emphasized by recent scholarship emphasizes (Chen & Hsu, 2020). This research addresses these gaps by assessing the effectiveness of selected online applications in improving students' writing skills through a carefully balanced combination of dialogue, structure, and autonomy within an asynchronous virtual learning model. In order to achieve meaningful and sustainable improvements in academic writing, integrating theory-driven design with technology-mediated instruction is crucial (Bond et al., 2021).

Research Objectives:

- To assess the effectiveness of asynchronous virtual learning activities, designed within the framework of Transactional Distance Theory, in enhancing undergraduate students' English writing skills.
- To analyse the role of dialogue, structure, and learner autonomy in facilitating measurable improvements in writing proficiency through multi-platform applications.
- To examine students' perceptions, engagement patterns, and feedback on asynchronous writing

activities to inform pedagogical strategies in higher education.

Materials and Methods

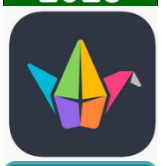
Participants

The study involved 452 undergraduate students from various academic disciplines at a higher education institution in Bangalore, India; AIMS Institutes. The participants were selected through purposive sampling to ensure inclusion of learners with diverse English proficiency levels. The group consisted of 198 male and 255 female students, aged between 18 and 22 years. All the participants had the foundation knowledge on English and were familiar with basic digital learning platforms. The informed consent was obtained prior to participation from the participants and they were reassured that their identity would remain anonymous and confidential in the research report. In educational technology research, Purposive sampling helps produce more meaningful insights into learning outcomes and captures diverse proficiency levels (Creswell & Plano Clark, 2018).

Instruments and Materials

Eight online applications formed the core of the asynchronous learning and Transactional Distance Theory framework:

Table.1- The List of Applications Used in the Study

	Learn English Grammar - British Council	Mobile app offering grammar lessons, quizzes, and exercises to enhance English grammar accuracy.	Android OS& iOS
	IELTS Writing: Essays & Test	Provides model essays, writing tasks, and tips to improve IELTS writing band scores.	Android OS& iOS
	IELTS Writing App 2025	Latest IELTS writing practice platform with updated question patterns and sample responses.	Android OS& iOS
	Padlet	Collaborative online bulletin board enabling students to post, share, and comment on writing tasks.	Android OS& iOS
	BBC Learning English	Offers videos, quizzes, and articles for improving English listening, vocabulary, and writing.	Android OS& iOS
	Flipgrid	Video discussion platform for peer interaction and feedback on spoken and written assignments.	Android OS& iOS
	Improve English Writing Skills	App providing structured writing exercises, tips, and grammar support for learners.	Android OS& iOS
	English Writing All in One	Comprehensive tool integrating essays, letters, applications, and grammar for writing practice.	Android OS& iOS

These are the most popular and highly rated English-learning apps on Play store. This list counts usage among the two application stores (Apple App Store and Android Market). Increased learner motivation and sustained engagement are often associated with High user ratings and widespread adoption of mobile language apps (Ahn & Lee, 2016).

Table.2-Experiment Design Plan

Phase	Activity	Description	Duration	Outcome
Phase 1	Pre-test Administration	Assessment of baseline writing skills using MCQs and descriptive questions.	Week 1	Baseline proficiency data collected
Phase 2	Implementation of 24 Asynchronous Activities	Structured writing activities using selected mobile applications with assignments and quizzes.	Weeks 2–11	Skill development through guided practice
Phase 3	Assignment Submission & Monitoring	Assignments submitted via Google Classroom; in-app quizzes recorded for formative assessment.	Throughout Intervention	Continuous performance tracking
Phase 4	Post-test Administration	Assessment of writing proficiency after intervention using structured test format.	Week 12	Measurement of improvement

Table 3. Research Procedure

Phase	Activities / Steps	Purpose / Outcome
Pre-test Phase	Administration of MCQs and descriptive questions. Rubric-based scoring for descriptive answers. AI-generated qualitative feedback collected for diagnostic insights.	Establish baseline data on learners' writing proficiency and analytical ability.
Intervention Phase (12 Weeks)	Weekly asynchronous writing tasks delivered through selected mobile applications. Activities designed in alignment with Transactional Distance Theory (TDT) — Dialogue, Structure, and Learner Autonomy. Continuous AI feedback provided after each descriptive task to foster self-reflection. Supplementary communication via email and WhatsApp for updates and clarifications.	Enhance learners' writing skills through asynchronous, app-based activities and promote engagement, interaction, and autonomy.
Post-test Phase	Administration of MCQs and descriptive questions (20 MCQs and 10 descriptive). Rubric-based scoring of descriptive answers with AI-generated qualitative feedback. Normalization of pre-test and post-test scores to a 100-point scale.	Evaluate writing skill improvement and ensure comparability between pre-test and post-test performance.
Feedback and Interviews	Administration of post-test feedback questionnaire. Semi-structured interviews conducted, recorded, transcribed using ChatGPT, and coded thematically.	Assess learner perceptions of the asynchronous learning process and AI-driven feedback.
Data Analysis	Quantitative: Paired-sample t-tests to compare pre-test and post-test scores; Cohen's d for effect size; normalization ensured comparability. Qualitative: Thematic analysis using Vosk Audio Transcription for interview transcripts and open-ended questionnaire responses, mapped to TDT components.	Determine statistical significance of improvement and identify qualitative patterns in learner engagement, autonomy, and writing skill development.

The pre-test consisting 15 multiple-choice questions (MCQs) (1 mark each) assessing grammar and 15 descriptive questions (5 marks each) assessed with a 5-point rubric covering content, organization, vocabulary, grammar, and mechanics. There's an enhancement of transparency and promotion of self-regulated learning by clarifying expectations and improvement pathways by Rubric-based assessment (Andrade, 2005). The post-test consisting 20 MCQs (1mark each) and 10 descriptive questions (5 marks each), following the same rubric criteria for descriptive items. Normalization: Raw scores from both tests were converted to a 100-point scale for comparability. For measuring instructional impact in educational research, Pre-test–post-test designs are widely recognized as an effective tool (Field, 2018). The AI-Generated feedback for both pre-test and post-test descriptive responses was provided after the experiment using an AI tool in detailed qualitative feedback without assigning scores as we have already taken scores using Rubrics which are shown to the samples. Formative learning is supported by Automated Feedback systems by providing immediate, personalized, and linguistically detailed feedback to learners (Sun & Gao, 2019). The feedback questionnaire consists of a 30 items Likert-scale instrument administered after the post-test to gauge learner perceptions of the activities, approach, the theory and tools. Additionally, semi-structured interviews were conducted with 18 stratified participants (highest, lowest, and average scorers; balanced gender representation) to capture detailed reflections on learning experiences of the learners. A significant improvement in grammatical accuracy, coherence, and overall writing proficiency has been shown by progressive, scaffold online writing interventions (Li, 2020).

Null Hypothesis H0: There is no significance difference between students' marks of pre-test skill training and students' marks of post-test skill training.

Alternative Hypothesis H1: There is a significant difference between students' marks of pre-test skill training and students' marks of post-test skill training.

Results

Table 4. Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Students marks of pre-test skill training	43.9366	452	17.88460	.84122
	Students marks of post-test skill training	62.6322	452	8.83337	.41549

Table 5. Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Students marks of pre-test skill training & Students marks of post-test skill training	452	.150	001.

Table 6. Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 Students marks of pre-test skill training - Students marks of post-test skill training	-18.69555	18.71952	.88049	-20.42593	-16.96518	-21.233	451	.000

In table4 the p-value obtained (0.001) is below the significance level of 0.05, indicating a statistically significant difference; therefore, the null hypothesis is rejected in favour of the alternative hypothesis. There is a significant difference between the students' marks of pre-test and students' marks of post-test. The paired samples statistics revealed a substantial improvement in students' writing performance after the asynchronous skill training intervention. The mean pre-test score (M = 43.94, SD = 17.88) was significantly lower than the mean post-test score (M = 62.63, SD = 8.83), reflecting a mean increase of 18.70 points. The 95% confidence interval for the mean difference ranged from –20.43 to –16.97, confirming that this improvement is unlikely to have occurred by chance. For evaluating instructional effectiveness in pre-post educational studies, Paired-sample t-tests are a robust statistical method (Field, 2018). A significant pre-post gains have been reported following structured digital interventions in similar

studies of mobile-assisted writing instruction (Gao & Zhang, 2020).

Standard deviation-SD, Standard Error Mean-SEM

In table 5 the paired samples correlation between pre-test and post-test scores was weak but statistically significant ($r = 0.150$, $p = 0.001$), indicating that while there was some consistency in individual performance rankings, post-test outcomes were largely influenced by the intervention rather than initial proficiency levels alone.

In table 6, the paired-sample t-test confirmed that this difference was statistically significant, $t(452) = –21.23$, $p < 0.001$. The effect size, calculated using Cohen's d for paired samples, was 0.999, which is considered large according to Cohen's conventions, highlighting a strong and practically meaningful impact of the intervention on students' English writing skills.

Additionally, the smaller standard deviation in post-test scores suggests reduced performance variability, indicating that the instructional approach not only improved overall proficiency but also led to more consistent outcomes across the participant group. Collectively, these results provide robust evidence that the integration of asynchronous, Transactional Distance Theory (TDT)-based writing activities which is supplemented by AI-generated feedback that had a significant and educationally meaningful effect on learner achievement.

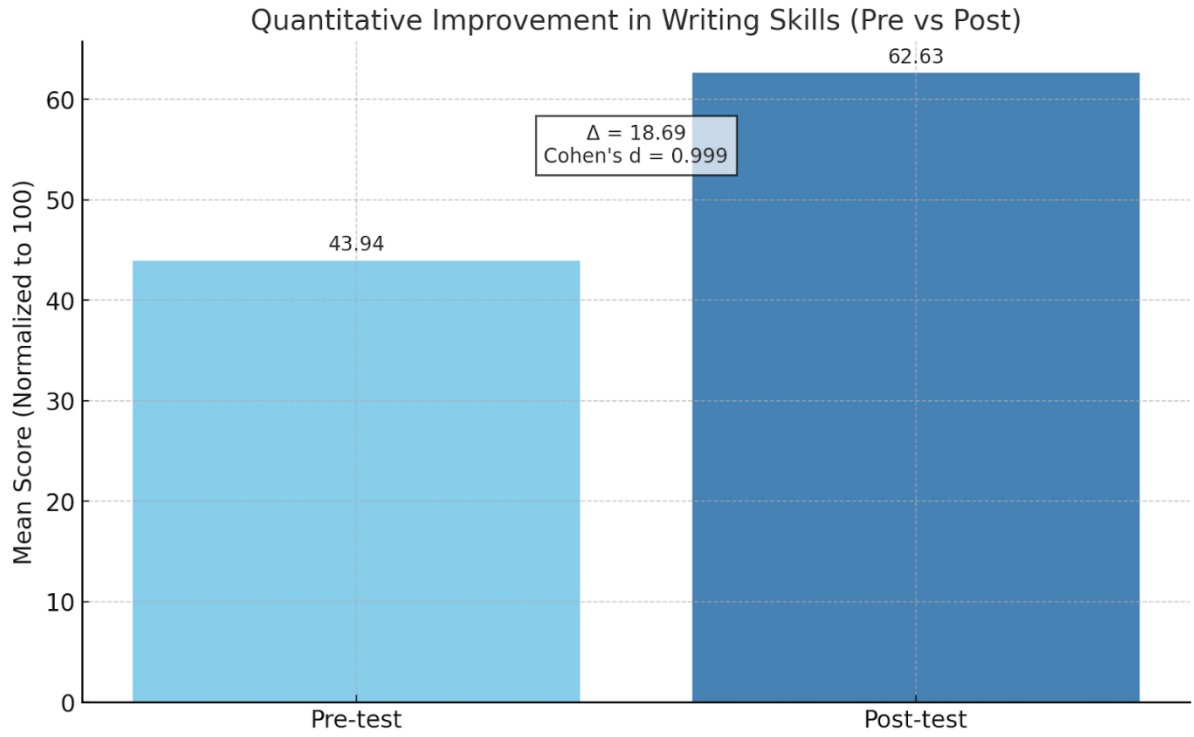


Figure 1. Quantitative Improvement in Writing Skills

Figure 1 confirms that the intervention had a strong and meaningful impact on writing skills.

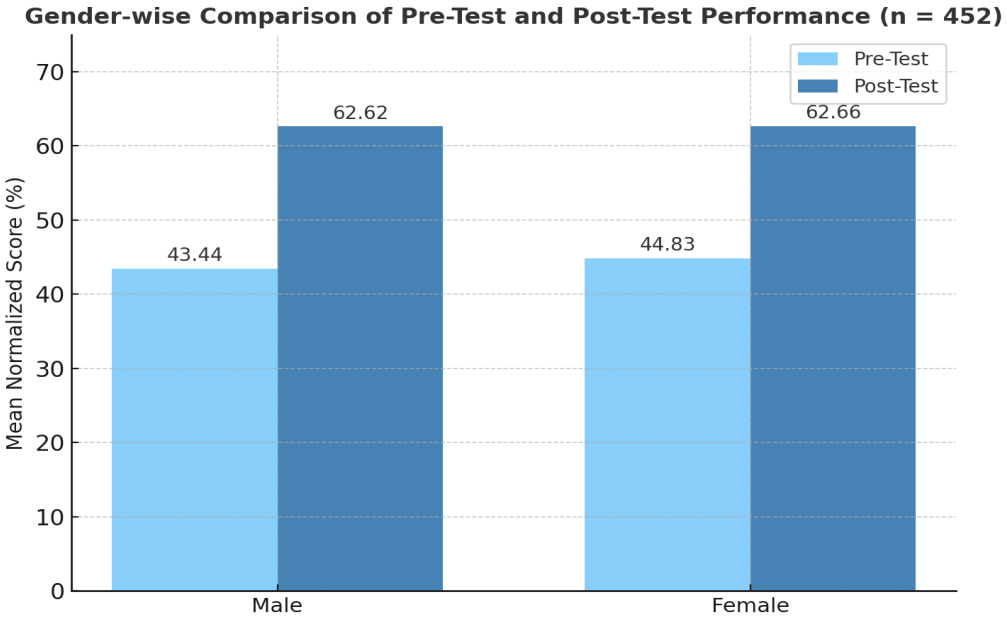


Figure 2. Gender-wise Comparison of Pre-Test and Post-Test Performance (n = 452)

Figure 2. compares male (n = 291) and female (n = 161) students' mean normalized scores before and after the intervention. Both the groups show marked improvement from 43–45 % in the pre-test to about 63 % in the post-test. The minimal gap between post-test means (M_{male} = 62.62, M_f_{emale} = 62.66) indicates that the asynchronous, AI-supported writing instruction produced gender-neutral learning gains, validating its equitable effectiveness. Equitable learning outcomes are tend to be produced across gender groups when online writing environments are well-designed (Lin & Warschauer, 2015).

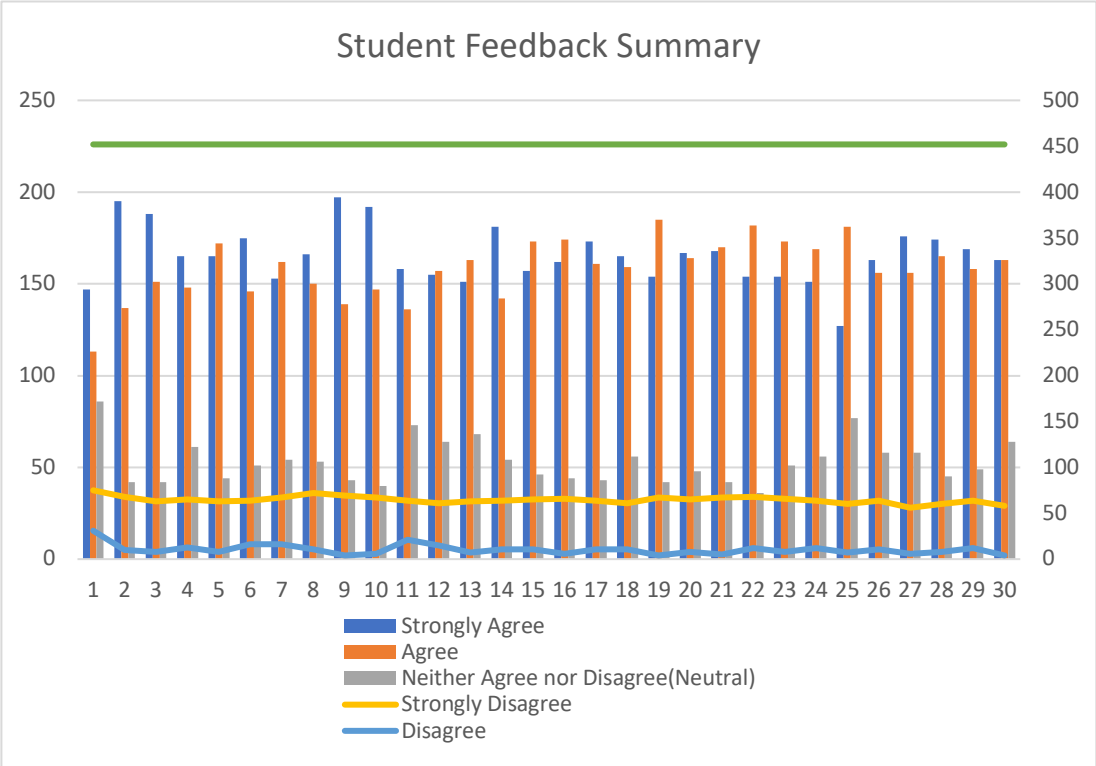


Figure 3. Student Feedback Summary

Figure 3 represents the 30 feedback statements which were given in the feedback questionnaire for which Strongly Agree and Agree together account for nearly 70–75% of all responses. The highest positive responses (Strongly Agree + Agree) were recorded for the questions relating to the benefits of virtual learning platforms, the effectiveness of the Transactional Distance Theory, the usefulness of asynchronous

feedback, and the role of AI and technology in enhancing writing skills. Neutral responses averaged around 12–15%, indicating a small group of students remained undecided or neutral towards virtual learning, Disagree and Strongly Disagree combined stayed below 10% across most questions, confirming overall acceptance of the intervention. The feedback summary (n = 452) reveals a strong positive perception of the asynchronous mode, Transactional Distance Theory and AI-supported writing model. A majority of respondents (≈70%) either Strongly Agreed or Agreed that the virtual platform enhanced engagement, improved writing proficiency, and provided flexible learning opportunities. Neutral responses (≈14%) suggest a small segment required additional adaptation time to self-directed learning. Minimal disagreement (<10%) highlights high satisfaction with app-based, feedback-driven activities. The chart shows overall positive responses, with nearly three-fourths of students agreeing that asynchronous feedback and digital applications along with TDT enhanced their writing skills. The learners' motivation and ownership of learning are enhanced through asynchronous models, particularly in writing development (Hrastinski, 2019).

In recent studies, there's a consistent reporting of high levels of learner satisfaction with asynchronous and AI-supported writing platforms (Albiladi & Alshareef, 2019).

Table 7. Thematic Analysis Summary of Semi-Structured Interviews

Interview Aspect	Description	Key Student Insights	Link to Study Elements (TDT / Others)
Virtual vs. Traditional Learning	Students compared virtual platforms with classroom teaching.	Virtual learning felt more flexible and less intimidating, but some missed real-time teacher presence.	Dialogue (support), Asynchronous learning.
Flexibility of Asynchronous Learning	Students reflected on pacing and deadlines.	Appreciated freedom to complete tasks anytime; reduced anxiety. Some struggled with self-discipline.	Autonomy (self-paced), Asynchronous design.
Effectiveness of Applications	Apps used for writing tasks across genres.	Found apps engaging and practical (British Council, IELTS Writing, Padlet, Flipgrid, BBC English). Padlet & Flipgrid improved creativity and peer interaction.	Structure (sequenced tasks), Dialogue (peer exchange).
Rubric-Based Assessment	Clarity of evaluation through rubrics.	Rubrics gave transparency; guided students on how to improve specific writing components.	Structure (clear expectations).
AI-Generated Feedback	Use of ChatGPT for descriptive feedback.	Students valued detailed comments; AI spotted grammar and vocabulary errors they often missed. Feedback was formative, not intimidating.	Autonomy (self-revision), Dialogue (teacher–AI learner support).
Dialogue & Interaction	Communication through WhatsApp, email, Padlet discussions.	WhatsApp helped quick clarification; Padlet enabled peer comments. Enhanced connectedness despite distance.	Dialogue (interaction reduces transactional distance).
Challenges & Barriers	Technical, motivational, and contextual challenges.	Internet issues, app navigation difficulties, and lack of synchronous presence cited. Motivation varied.	Cross-cutting barrier (Dialogue, Structure, Autonomy).
Confidence in Communication Skills	Impact on interviews, group discussions, workplace communication.	Reported higher confidence in writing CVs, formal letters, and answering interview-style questions.	Outcomes aligned with CO2 & CO3.
Learner Autonomy	Students' control over their own learning.	Reported ownership of learning, choosing when/how to complete activities. AI feedback supported independence.	Autonomy (core TDT element).

Overall Perception of Model	General reflections on the program.	Majority described the program as effective, innovative, and more engaging than textbooks. Requested more multimedia-based tasks.	Holistic validation of Virtual + TDT + Asynchronous framework.

Stratification Criteria and Participant Classification

The pre-test and post-test scores of 18 stratified participants, showcasing their individual improvement (Δ scores) across gender, program, and semester were the base for selecting the candidates for interview. It highlights distinct performance trends such as strong positive gains (e.g., Suriya Prakash N +52.54, Manoj N +51.43) reflecting the impact of asynchronous learning, rubrics, and AI feedback; moderate gains among average performers indicating steady progress; marginal improvements linked to limited engagement; and negative shifts suggesting test anxiety, dependence on AI, or external factors. The gender distribution was balanced, while program-wise variations revealed that BBA and BCom formed the core group, with BCA and Aviation showing extremes and BHM students performing consistently well due to communication-focused curricula. The stratified sampling represented all performance levels such as high, medium, low, and negative, effectively validating the diversity of the qualitative data. Overall, it assures that the TDT-based asynchronous intervention enhanced writing proficiency for most of the learners, particularly for lower-performing learners, while emphasizing the need for continuous monitoring and structured support to avoid any decline in progress. The integration of quantitative and qualitative findings provides converging evidence that asynchronous, TDT-based writing instruction enhanced by rubrics, AI feedback, and multi-app engagement significantly developed writing skills. At the same time, thematic insights reveal critical nuances about learner autonomy, variability in outcomes, and the importance of continuous support to uphold progress. Over eighteen participants were interviewed (semi-structured interview) to capture diverse perspectives across gender, academic streams, and achievement levels (highest, lowest, and average scorers). The audio recordings (mp4 Files) from the semi-structured interviews were transcribed into written text using Vosk Audio Transcription, and the resulting transcripts were then analysed thematically. Thematic analysis following Braun & Clarke's (2006) framework generated ten key themes, aligned with the semi-structured questions and the broader pedagogical framework of the study. Braun and Clarke's (2006) framework is followed by thematic analysis which is widely used in educational research to systematically interpret learners' experiences.

1. Virtual vs. Traditional Learning

The students consistently compared the virtual model with their past classroom experiences. Many found virtual learning more flexible, less intimidating, and more inclusive, while some missed direct in-person interaction.

"I could attempt assignments at home with less stress, unlike class exams where I felt nervous." (Participant 11, Male, BBA Aviation)

"I missed the chance to ask immediate questions to the teacher, but the apps gave me more practice." (Participant 7, Female, B.Com)

This suggests that virtual learning lowered affective barriers, but requires supplementary dialogue channels for maximum impact.

2. Flexibility of Asynchronous Learning

The students highlighted the advantages of self-paced learning. They could complete tasks at their own convenience, revisiting instructions and resubmitting assignments. However, some admitted procrastination without fixed class hours.

"I did the tasks at night when I was free. That freedom made me enjoy learning more." (Participant 22, Female, BHM)

"Sometimes I delayed tasks because there was no fixed class time." (Participant 16, Male, BCA)

This reflects the Autonomy dimension of TDT empowering learners while also requiring self-regulation.

3. Effectiveness of Applications

The students evaluated the apps as engaging and useful. British Council Grammar was praised for grammar drills, Padlet for peer creativity, and IELTS Writing apps for formal writing practice. Flipgrid and BBC English supported idea generation.

"Padlet was fun because I could see how others wrote." (Participant 4, Female, B.Com)

"The IELTS app gave me real examples of letters, which helped for interviews." (Participant 18, Male, BBA)

The apps collectively provided structure, ensuring progressive skill-building across genres. Critical thinking, audience awareness, and revision skills are enhanced among ESL learners by Peer feedback and collaborative writing platforms (Bikowski & Vithanage, 2016).

4. Rubric-Based Assessment

The learners valued the transparency of rubrics in pre- and post-tests. They reported that rubrics clarified teacher expectations in terms of grammar, organization, vocabulary, and mechanics.

"The rubric showed me what marks were for grammar or vocabulary, so I knew what to improve." (Participant 25, Female, BBA Aviation)

This underscores the Structure element in TDT, where explicit design reduced ambiguity.

5. AI-Generated Feedback

The students were highly positive about AI feedback provided (post experiment) for each descriptive response. They said it pinpointed errors they often overlooked.

"AI feedback told me why my sentences were wrong, which helped me rewrite." (Participant 9, Male, BCA)

"It was not just marks; it gave reasons, so I learned more." (Participant 3, Female, B.Com)

This reflects Dialogue and Autonomy wherein feedback acted like a tutor while encouraging independent correction.

6. Dialogue & Interaction

Even though the model was asynchronous, structured channels like WhatsApp groups, Padlet, and email offered opportunities for peer and teacher exchange of information for clarification and doubts.

"In WhatsApp, we clarified doubts instantly." (Participant 14, Male, BBA Aviation)

"Reading others' Padlet posts gave me ideas." (Participant 20, Female, BHM)

Thus, Dialogue, as theorized in TDT, was successfully embedded into asynchronous scenarios.

7. Challenges & Barriers

The students reported technical and motivational barriers. Internet instability and difficulty navigating apps were common. Some also felt isolated at times.

"Once I couldn't upload on Padlet because of the internet, which made me frustrated." (Participant 28, Female, BBA)

"Flipgrid was confusing at first." (Participant 6, Male, BCA)

These issues reveal the constraints of asynchronous models, especially in developing contexts.

8. Confidence in Communication Skills

Many learners said the program helped beyond writing especially in interview and group discussion contexts. Exposure to structured writing tasks and practice with formal letters boosted their self-assurance.

"I feel more confident to face interviews now because I know how to write and explain myself." (Participant 12, Female, B.Com)

This aligns with the course outcomes focusing on employability and communication. Learners' confidence in academic and professional communication is positively influenced due to the improved writing proficiency through digital interventions (Shadiev & Yang, 2020).

9. Learner Autonomy

The students reported taking ownership of learning, managing schedules, and self-monitoring progress.

"I felt in control of my learning, which was new for me." (Participant 2, Male, BBA Aviation)

This confirms TDT's emphasis on Autonomy as central to distance learning success.

10. Overall Perception of the Study

The majority found the course effective and motivating. They requested more multimedia and interactive extensions in the future.

"It was better than textbooks because it gave activities and examples." (Participant 30, Female, BHM)

Together, the integration of the quantitative and qualitative results demonstrate that the quantitative evidence confirms statistically significant improvements in writing skill development and the qualitative insights explain *how* and *why* these improvements occurred: structured activities (Structure), AI feedback and dialogue channels (Dialogue), and flexible pacing (Autonomy) all contributed to growth. This triangulation method highlights the asynchronous, TDT-based model, supported by transparent rubrics and AI feedback, and significantly enhanced English writing skills while also fostering students' confidence and autonomous learning.

An additional layer of analysis that was incorporated into this study through the use of AI-generated feedback. While rubric-based assessment provided quantitative scores for each descriptive question in both pre-test and post-test, AI feedback was applied retrospectively during the data analysis phase. This feedback did not assign marks; instead, it offered qualitative commentary on aspects such as grammatical accuracy, lexical range, organization, coherence, and stylistic clarity.

For instance, AI feedback on a weak pre-test response noted:

"The response demonstrates an attempt to address the topic but lacks coherence. Sentences are fragmented, vocabulary is repetitive, and transitions between ideas are missing. The student could improve clarity by using linking words and restructuring sentences into a logical order."

Conversely, feedback on a strong post-test response highlighted progress:

"This answer is well-structured and clear. The introduction frames the topic effectively, ideas are logically sequenced, and appropriate vocabulary (e.g., 'sustainable,' 'collaborative') is used accurately. Minor grammatical issues persist with subject–verb agreement, but overall cohesion has improved significantly compared to earlier attempts."

The students did not receive this AI feedback during the intervention, meaning it did not influence their learning outcomes directly. Instead, it served as a diagnostic tool for researchers, enriching the interpretation of rubric scores and triangulating results from semi-structured interviews and questionnaires. For instance, AI-generated feedback consistently supported rubric observations of improved sentence structure and cohesion, and in cases of decline, it emphasized repeated challenges like weak organization and vocabulary constraints. The integration of AI in this post hoc role adds methodological novelty to the study. It demonstrates how artificial intelligence can be used not only as a teaching aid but also as a research instrument, providing impartial descriptive insights that complement traditional evaluation methods. However, since learners did not act upon this feedback during the study, its

function remains analytical rather than pedagogical. Future research could integrate AI-generated feedback into asynchronous learning environments in real time, offering students continuous formative guidance alongside rubric-based evaluation, thereby enhancing learner autonomy and accelerating writing skill development. By enabling immediate revision and reflection, Real-time AI feedback has been shown to accelerate writing development (Chen & Hsu, 2020). There's an increase in employing AI-generated linguistic analysis as a supplementary research tool by researchers to triangulate writing assessment (Rahimi & Fathi, 2019).

Discussion

The instructional design of this study deliberately integrated theoretical underpinnings with practical execution. As discussed, the conceptual framework is rooted in Moore's Transactional Distance Theory (TDT), highlighting the relationship among Dialogue, Structure, and Learner Autonomy in asynchronous virtual learning environments (Moore, 2018). These dimensions informed every stage of the intervention, from the careful sequencing of activities to the incorporation of rubrics and AI-driven feedback for analysis. Table 3 complements this framework by presenting the 12-week implementation timeline, which operationalizes the TDT principles in practice. Dialogue was supported through integrated communication and reflective interaction opportunities (Hrastinski, 2019). Structure was reinforced by a progressively organized set of 24 activities (Anderson, 2020), and autonomy was fostered by the asynchronous model. The table shows how theory and practice were effectively integrated, supporting methodological rigor and enhancing the credibility of the study's outcomes. The findings of this study demonstrate that integrating asynchronous online applications, designed within the framework of Transactional Distance Theory (TDT), produced a significant and meaningful improvement in undergraduate students' English writing skills. Moore's balanced dialogue, structure, and autonomy are essential for reducing transactional distance in online learning which is supported by empirical research (Swan, 2001). The statistical evidence, with a mean increase of 18.70 points between pre-test and post-test scores and a large effect size ($d = 0.999$), confirms the effectiveness of the intervention. Importantly, the reduced variability in post-test scores suggests that the approach benefited not only high achievers but also weaker learners, thereby narrowing performance gaps and supporting more balanced achievement. These results highlight the potential of technology-mediated instruction in addressing one of the most persistent challenges in higher education; enabling consistent improvement for learners from diverse profiles.

A notable strength of this study was the dual use of a structured rubric and AI-generated feedback. The rubric assessed five dimensions; content, organization, vocabulary, grammar, and mechanics on a five-point scale. By incorporating multiple dimensions of performance, this approach provided a richer evaluation of writing proficiency, whereas traditional grading often privileges surface-level accuracy at the expense of higher-level skills. The analysis revealed significant improvements in grammar and organization, while vocabulary showed moderate progress. This indicates that asynchronous tasks and digital applications are highly effective for improving structural and grammatical skills, though additional targeted strategies may be required to enhance vocabulary development. The AI feedback enhanced the rubric scoring by giving focused insights aligned with specific criteria. The alignment between rubric descriptors and AI feedback enhanced transparency and reinforced learning. For example, students who scored "2" in coherence were often advised by the AI to "add topic sentences" or "improve transitions," while high-scoring students received feedback encouraging stylistic variation or advanced syntactic structures. This synergy increased the reliability of the evaluation system and ensured that feedback was not generic but tailored to specific learner needs. This alignment also reflects Hyland's (2019) assertion that effective feedback should promote metacognitive reflection. The combined use of rubrics and AI feedback supported learner autonomy; a cornerstone of TDT. Significantly, rather than passively receiving scores, students actively engaged in reflective revision after the experiment, developing the ability to identify weaknesses and plan targeted improvements. This also made the assessment fairer, because students could understand why they got certain scores and how to improve.

The observed improvements align with the three foundational components of TDT: Dialogue, Structure, and Learner Autonomy (Moore, 2018). Dialogue was facilitated by collaborative platforms such as Whatsapp Group, email, Padlet, Flipgrid and so on, which allowed students to share writing, comment on peers' drafts, and reflect through video responses. Padlet, Flipgrid, and British Council platforms are the mobile learning applications which have been widely reported to enhance collaboration, peer interaction, and reflective writing practice (Kukulska-Hulme & Shield, 2008). These asynchronous interactions helped sustain motivation and clarified task expectations, mitigating one of the common limitations of online learning-perceived isolation. Deeper engagement, shared meaning-making, and improved linguistic accuracy are promoted in Collaborative online writing (Lin & Warschauer, 2015). The learners' reflections during semi-structured interviews underscored the importance of peer-to-peer dialogue in boosting confidence and developing new writing strategies. Structure was embedded in the systematic design of 24 activities, ranging from grammar-based tasks to advanced written genres. Each activity was aligned with clear objectives, rubric criteria, and feedback mechanisms, ensuring coherence between instructional design and assessment. Anderson (2020) emphasizes that structured online

environments are essential to reducing learner uncertainty. This study supports that view by demonstrating how progressively increasing task complexity maintained engagement and guided learners toward higher levels of competence. Previous studies on parental involvement in language learning prove that structured external support systems whether digital or familial can have positive influence on learners' language proficiency and academic performance (Vicencio et al., 2025).

Learner Autonomy was reinforced by the asynchronous delivery mode, which allowed students to work at their own pace, revisit materials, and balance academic tasks with personal responsibilities. Notably, autonomy was supported through transparent rubrics and AI-generated feedback. This finding aligns with Hrastinski's (2019) observation that asynchronous models foster reflective learning when combined with clear guidance and feedback. Together, these components demonstrate how TDT provides a robust lens for designing and interpreting online writing interventions. Through the reduction of transactional distance, learners were able to connect more deeply with the material, participate in meaningful interactions, and take increased ownership of their writing progress.

The findings not only align with the objectives but also advance existing research on technology-mediated writing instruction. Li (2020) reported that mobile-assisted writing practice enhanced coherence and grammatical accuracy, findings that are echoed in this study's rubric-based results. Mobile-assisted writing practice has been consistently linked to grammatical accuracy, improved coherence, and learner autonomy (Li, 2020). Similarly, Ali (2021) highlighted the effectiveness of digital tools in increasing writing fluency and engagement in higher education, a finding that aligns with students' positive perceptions in this study. As reported in previous studies, the positive attitudes and readiness of educators toward online teaching-learning platforms suggest that the integration of digital applications into language instruction is both pedagogically viable and sustainable in higher education settings (Joseph et al., 2026). Su and Zou's (2022) systematic review underscored the role of collaboration in technology-enhanced language learning, which was strongly supported in this intervention through tools like Padlet and Flipgrid. Technology-enhanced collaborative learning environments facilitate sustained writing development, peer interaction, and critical reflection (Su & Zou, 2022). Bond et al. (2021), however, noted that the rapid shift to online instruction during COVID-19 often lacked sufficient structure, resulting in reduced engagement. The present study offers a contrasting perspective: when digital applications are embedded within a structured, theory-driven design, they can foster both engagement and measurable skill growth. The incorporation of digital tools within a systematically designed, theory-guided pedagogical framework fosters increased engagement and produces observable gains in learning performance (Bond et al., 2021). In this way, the study contributes not only empirical evidence but also theoretical innovation. It demonstrates that effective technology-oriented practices must be coupled with pedagogical frameworks such as TDT, moving beyond tool adoption to intentional instructional design. This synthesis of technology, theory, and assessment strengthens the reliability and transferability of findings across diverse higher education contexts.

There are several pedagogical implications that are raised. Firstly, combining rubric-based evaluation with AI feedback ensures transparency and learner-centred assessment. This enabled learners to understand why they received specific scores and how to enhance their performance, effectively transforming assessment into a formative experience. Secondly, the asynchronous approach respects learners' differing contexts, ensuring flexibility in participation without compromising academic standards. In a country like India, where students often balance studies with personal duties, flexibility is important to ensure everyone can take part equally. Thirdly, using different online applications helped the students explore many kinds of writing, preparing them for both academic work and real-world communication. This multidimensional exposure addresses concerns raised by Hyland (2019) that writing instruction must encompass creativity, organization, and critical thinking, not just grammatical accuracy. For institutions, the study stresses that adopting technology should go hand in hand with sound pedagogical planning. Faculty training programs in rubric use, AI integration, and asynchronous activity design are critical to implement these interventions on a larger scale. When institutions adopt such practices, they can enable curriculum transformation that can be replicated, evaluated, and adapted across programs. For effective large-scale implementation of digital writing instruction, faculty training in rubric use, AI integration, and asynchronous design is essential (Chen & Hsu, 2020).

Conclusion

In conclusion, the present study confirms that incorporating the selected online applications in an asynchronous mode wherein it's guided by TDT and supported by rubric-based assessment and AI feedback substantially enhance undergraduate students' English writing skills. By encouraging interaction, offering clear guidance, and helping students become more independent, the program improved performance and reduced gaps, leading to more consistent results among different learners. In order to integrate the digital applications into higher education curricula and contribute to bridging theoretical insights with practical instructional design, the findings of this study offer a replicable model. The study shows that students can make real progress in writing when technology is used in a planned way that supports both teaching and assessment.

Limitations and Future Research

Several limitations must be acknowledged while the present study provides robust evidence. The AI-

generated feedback was provided after test completion rather than in real time which limits opportunities for immediate feedback or revision. The usage of AI in real time while students work could strengthen step-by-step learning and should be explored in future studies. The intervention spanned only 12 weeks. Writing improvement is a slow process, and long-term studies are required to determine if gains remain over time. Longitudinal studies are necessary in order to determine whether digital writing gains are sustained over time (Rahimi & Fathi, 2019). The accessibility to digital resources was not a challenge in this study, but this may differ in less-resourced settings. Factors like access to devices, stable internet, and basic digital skills should be kept in mind which can affect how easily the study can be repeated while expanding it. Unequal access to devices and internet connectivity remains a major barrier to technology-mediated language learning in developing contexts (Almusharraf & Khahro, 2020). Future studies should compare asynchronous learning with blended and live (synchronous) methods to see which works best. In order to identify the most effective instructional model, future research should compare asynchronous, blended, and synchronous writing instruction (Hampel & Stickler, 2015). Future studies could build on this work by testing AI integration in real-time classrooms, including postgraduate and professional learners, and studying cultural influences on writing growth.

References

1. Ahn, J., & Lee, S. (2016). Students' experiences of mobile-assisted language learning. *Computer Assisted Language Learning, 29*(7), 1263–1285. https://doi.org/10.1080/09588221.2015.1061021
2. Albiladi, W. S., & Alshareef, K. K. (2019). Blended learning in English writing: A systematic review. *Education and Information Technologies, 24*(3), 2101–2131. https://doi.org/10.1007/s10639-019-09880-8
3. Ali, M. M. (2021). The impact of digital tools on English writing skills in higher education. *Asian Journal of Distance Education, 16*(2), 45–58. https://doi.org/10.5281/zenodo.567890
4. Almusharraf, N., & Khahro, S. (2020). Students' satisfaction with online learning experiences during the COVID-19 pandemic. *International Journal of Emerging Technologies in Learning, 15*(21), 246–267. https://doi.org/10.3991/ijet.v15i21.15647
5. Anderson, T. (2020). *The theory and practice of online learning* (3rd ed.). AU Press.
6. Andrade, H. (2005). Teaching with rubrics: The good, the bad, and the ugly. *College Teaching, 53*(1), 27–31. https://doi.org/10.3200/CTCH.53.1.27-31
7. Bikowski, D., & Vithanage, R. (2016). Effects of peer feedback on ESL writing. *Journal of Second Language Writing, 32*, 1–17. https://doi.org/10.1016/j.jslw.2016.01.002
8. Bond, M., Bedenlier, S., Marín, V. I., & Händel, M. (2021). Emergency remote teaching in higher education: Mapping the first global online semester. *International Journal of Educational Technology in Higher Education, 18*(1), 50. https://doi.org/10.1186/s41239-021-00282-x
9. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa
10. Chen, C. M., & Hsu, S. H. (2020). Personalized mobile-assisted language learning system for writing. *Computers & Education, 149*, 103805. https://doi.org/10.1016/j.compedu.2020.103805
11. Creswell, J. W., & Plano Clark, V. L. (2018). *Designing and conducting mixed methods research* (3rd ed.). Sage.
12. Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). Sage.
13. Gao, L., & Zhang, L. (2020). Mobile-assisted collaborative writing in ESL. *System, 90*, 102214. https://doi.org/10.1016/j.system.2020.102214
14. Garrison, D. R., Anderson, T., & Archer, W. (2010). The community of inquiry framework: Theoretical foundations. *Internet and Higher Education, 13*(1–2), 5–9. https://doi.org/10.1016/j.iheduc.2009.10.003
15. Hampel, R., & Stickler, U. (2015). Online language teaching and learning. *Modern Language Journal, 99*(1), 50–64. https://doi.org/10.1111/modl.12125
16. Hrastinski, S. (2019). What do we mean by blended learning? *TechTrends, 63*(5), 564–569. https://doi.org/10.1007/s11528-019-00375-5
17. Hyland, K. (2019). *Second language writing.* Cambridge University Press.
18. Joseph, C. H., Osiesi, M. P., Adaramoye, T. O., & Hammed, O. S. (2026). Sustainability of online teaching–learning platforms in Nigerian tertiary institutions: Assessing lecturers' attitude, readiness, and teaching styles. *International Research Journal of Multidisciplinary Scope, 7*(1), 157–173. https://doi.org/10.47857/irjms.2026.v07i01.06157
19. Kukulska-Hulme, A., & Shield, L. (2008). An overview of mobile-assisted language learning. *ReCALL, 20*(3), 271–289. https://doi.org/10.1017/S0958344008000335
20. Li, M. (2020). Mobile-assisted academic writing practice: Improving coherence and grammatical accuracy. *Journal of Computer Assisted Language Learning and Teaching, 10*(4), 23–39. https://doi.org/10.4018/JCALLT.2020100102
21. Lin, C. H., & Warschauer, M. (2015). Online collaborative writing and language development. *Computer Assisted Language Learning, 28*(4), 389–411. https://doi.org/10.1080/09588221.2014.881384
22. Moore, M. G. (2018). The theory of transactional distance. In M. G. Moore & W. C. Diehl (Eds.),

Handbook of distance education (4th ed., pp. 66–85). Routledge.

23. Rahimi, M., & Fathi, J. (2019). AI-based feedback in ESL writing. *Language Learning & Technology, 23*(2), 45–60.
24. Shadiev, R., & Yang, M. (2020). Mobile learning in ESL writing instruction. *Computer Assisted Language Learning, 33*(5–6), 465–489. https://doi.org/10.1080/09588221.2019.1633354
25. Su, Y., & Zou, D. (2022). Technology-enhanced collaborative language learning: A systematic review. *Computer Assisted Language Learning, 35*(1–2), 89–118. https://doi.org/10.1080/09588221.2019.1633353
26. Sun, Y., & Gao, F. (2019). Automated feedback and writing improvement. *System, 82*, 1–12. https://doi.org/10.1016/j.system.2019.02.006
27. Swan, K. (2001). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education, 22*(2), 306–331. https://doi.org/10.1080/0158791010220208
28. Vicencio, C. D., Vicencio, C. S., & Yambao, M. J. V. (2025). Parents as para-teachers in pupils' language proficiency. *International Research Journal of Multidisciplinary Scope, 6*(4), 1537–1551. https://doi.org/10.47857/irjms.2025.v06i04.06148
29. Zhang, Z. V., & Hyland, K. (2018). Teacher feedback in second language writing. *Journal of Second Language Writing, 40*, 1–13. https://doi.org/10.1016/j.jslw.2018.03.004