THE EFFICACY OF DIGITAL SMARTBOARD IN SAUDI ARABIAN ENGLISH CLASSROOMS

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ABSTRACT

Pedagogical models are adapting the competencies required for 21st-century learning. The integration of interactive smartboards is one of the practices which have attained popularity in English language development. This study examines the pedagogical influence of the Digital smartboard within English as Second Language (ESL) classrooms in Saudi Arabia. Adopting a descriptive and quantitatively oriented research design, the investigation encompassed the broader population of Saudi ESL learners. Employing simple random sampling, 150 10th grade students were selected from ten schools located in the western region of the Kingdom, a site chosen via purposive sampling. A standardized placement assessment was administered to classify learners into two equivalently proficient cohorts of sixty students each. The control group received conventional, textbook-centred instruction guided primarily by the teacher, whereas the experimental group engaged in lessons mediated through the smartboard. The intervention spanned thirty instructional hours. Post-intervention analyses demonstrated a statistically significant performance advantage for learners taught with Digital Smartboard-enhanced instruction. These results underscore the positive contribution of interactive smartboard technology to ESL learning outcomes and highlight smartboard's potential as an effective pedagogical instrument in technologically enriched language classrooms.

KEYWORDS: Smartboard, Interactive Learning, ESL Instruction, Digital Pedagogy, Saudi Arabia.

1. INTRODUCTION

The incorporation of educational technologies has emerged as a defining feature of contemporary instructional practice, particularly within Saudi Arabian schools that are increasingly furnished with advanced digital infrastructures such as high-speed internet, computer labs, and integrated classroom technologies (Al-Qaimari & Khan, 2025). These developments have catalysed pedagogical innovation by enabling more interactive, learner-centred approaches to instruction (Ali, 2024). In keeping with global shifts, the infusion of technology into various academic disciplines has begun to redefine conventional teaching paradigms, offering tools and modalities that significantly enrich the learning process. Among these digital resources, the smartboard has attracted growing interest for its capacity to support language development and foster interactive engagement (Ali, 2024). Designed as an intuitive digital board, the smartboard offers educators a multifunctional interface through which classroom instruction can be enhanced (Ali et al., 2025).

The convergence of technology and pedagogy within language education, in particular, has created new opportunities for adaptive and customizable learning environments (Bay & Hartman, 2025). Such tools are especially valuable in ESL contexts, where diverse learner needs necessitate instructional designs that are both flexible and communicatively oriented. Digital Smartboard is equipped with interactive features and multimodal affordances, exemplifies this pedagogical innovation by supporting authentic linguistic interaction and actively promoting learner participation (Alhumsi, 2024).

1.1. Digital Smartboards

Smartboards function as interactive digital surfaces that enable reciprocal engagement between teachers and students, thereby enhancing classroom dynamism and facilitating active learning (Luo et al., 2023). As versatile and user-friendly instructional devices, they can simultaneously accommodate multiple learners and foster a collaborative learning atmosphere (Warner, 2025). Unlike traditional blackboards which often produce passive learning scenarios wherein students merely transcribe information smartboards alleviate the cognitive load associated with extensive note-taking and instead allow learners to directly engage with multimodal content.

For educators, these boards provide an efficient digital interface capable of storing, retrieving, and modifying instructional materials without repetitive manual preparation (Yang & Li, 2025). Since content remains electronically archived, instructional continuity is better preserved. Furthermore, the availability of smartboards within regular classrooms eliminates the need for transferring students to computer labs, thereby transforming ordinary learning spaces into technology-rich environments that promote interaction among learners, teachers, and digital resources. Operating on systems comparable to standard computers and functioning through touch or stylus input, smartboards support a wide array of instructional activities including multimedia integration, real-time annotation, and collaborative tasks which collectively enhance their pedagogical value.

1.2. Saudi English Language Context

A particular area of difficulty within Saudi ESL classrooms is grammar instruction specifically, the mastery of English tenses, which plays a crucial role in ensuring accurate verbal and written communication (Ali et al., 2025). Numerous studies have shown that Saudi learners often struggle with tense usage, reporting persistent confusion and limited ability to apply tense rules in communicative contexts. Traditional grammar instruction, typically characterized by teacher-controlled explanations and repetitive drills, affords few opportunities for learners to develop autonomous competence (Alqahtani, 2025). This reliance on conventional instruction exacerbates existing challenges and underscores the necessity for more innovative, interactive tools that can strengthen learners' grasp of complex grammatical structures.

Given these considerations, the present study explores the effectiveness of Smartboard as a technologically mediated smartboard tool designed to enhance the acquisition of English tenses among Saudi ESL learners.

1.3. Statement of the Problem

Traditional instructional methods have demonstrated limited effectiveness in supporting robust second language (L2) development. Learners frequently contend with uninspiring teaching techniques, rigid curricular structures, and excessive dependence on memorization, all of which hinder meaningful linguistic engagement. Additional barriers such as insufficiently trained instructors, overcrowded classes, and diminished learner motivation compound these challenges, leaving students ill-equipped to internalize and apply essential grammatical concepts. Mastery of English

tenses remains a persistent obstacle; prevailing pedagogical practices tend to emphasize rule memorization rather than conceptual understanding, resulting in superficial learning and limited functional competence. This sustained reliance on outdated methods highlights the need for innovative tools that can facilitate deeper comprehension and more effective acquisition of tense structures.

1.4. Research Question

1. What is the effect of Smartboard-based instruction on the acquisition of English tenses among Saudi EFL learners?

1.5. Research Objectives

This study seeks to achieve the following objectives:
1. To investigate the influence of Smartboard on Saudi ESL learners' mastery of English tense structures.
2. To assess the extent to which Smartboard contributes to enhanced academic performance among local Saudi students.

1.6. Significance of the Study

The present study holds considerable importance within the current Saudi educational framework. The deployment of smartboard technologies introduces interactive, visually engaging, and pedagogically adaptive modalities that align with the evolving needs of contemporary learners. As educational ecosystems become increasingly interconnected and digitally enhanced, the relevance of technologically supported instruction continues to grow. This study, therefore, provides critical insights into the pedagogical potential of Smartboards. Thus, offering empirical evidence on its capacity to strengthen the acquisition of English tenses and contribute to more effective EFL learning experiences in Saudi Arabia.

2. LITERATURE REVIEW

A considerable body of research has examined the pedagogical affordances of Smartboards, highlighting their capacity to enrich instructional delivery through interactive and multimodal functionalities (Fuller, 2025; Ndwandwe, Ramaligela & Mtshali, 2024; Mormah, 2024). Although Smartboards differ in design and technological configuration, they share a common pedagogical ambition: to advance teaching and learning by facilitating dynamic, visual, and participatory environments. Typically composed of a touch-responsive interface linked to a computer and projector, these devices enable teachers to present content in varied formats. Depending on the model, interaction may occur through stylus-based inputs or touch navigation, supporting actions such as dragging, highlighting, and annotating. Their integrated features ranging from multimedia display and interactive graphics to zooming functions, timers, and animation tools are intended to cultivate learner engagement and increase instructional efficiency. Empirical studies consistently report their usefulness across English language learning contexts.

From the perspective of educators, Smartboards offer a range of practical benefits, including streamlined access to online materials, reduced lesson-preparation burdens, and the ability to archive instructional content for later use (Alsaied et al., 2025). Research further indicates that the meaningful integration of Smartboards can promote learners' cognitive, social, and creative development while enhancing motivation and participation in classroom activities (Walter & Tiwari, 2025). Their inherent interactivity encourages collaboration, problem-solving, and student-centred learning, thereby creating environments conducive to active knowledge construction (Minor et al., 2013).

Nevertheless, despite their advantages, Smartboards are not without constraints. Technical issues such as device malfunction, calibration errors, and maintenance requirements as well as the high financial investment needed to procure and sustain these tools have been identified as major challenges (Somyürek, Atasoy & Özdemir, 2009). Moreover, Yousef et al. (2024) emphasized the pedagogical impact of Smartboards is largely contingent upon teachers' competence in integrating them effectively. This underscores the necessity for adequate preparation, including planning time, content development, and ongoing support (Ha Al-Qirim et al., 2020).

One of the most persistent limitations relates to insufficient professional training. Xu (2025) argued that meaningful integration requires structured and sustained professional development, enabling educators to acquire both technical proficiency and pedagogical insight (Hatfield, 2025). Similarly contend that successful Smartboard use depends on teachers who are flexible, collaborative, and knowledgeable in instructional design. Without systematic training, the potential of Smartboards remains underutilized.

2.1. Activity Theory

Activity Theory (AT), grounded in the socio-cultural tradition of Russian psychology, provides a

robust analytical lens for examining human action as a socially mediated and purposeful activity. Central to this framework is the notion that learning and development emerge through dynamic, goal-directed interactions between subjects (individuals or groups) and objects (the motives or goals they pursue). AT therefore shifts analytical attention away from isolated mental processes to the broader networks of cultural tools, social structures, and historical conditions that shape human practices.

Building on Vygotsky's (1978) foundational concepts, Engeström (1987) expanded AT to conceptualize learning as a systemic, culturally mediated process involving multiple interdependent components. AT has since been widely applied in education, organizational analysis, and human–computer interaction (Zhang & Liu, 2025). Within educational research, it is particularly valuable for exploring how digital tools mediate learning and transform classroom dynamics (Sy et al., 2025). Studies employing AT have examined collaborative learning, teachers' professional growth, and the integration of emerging technologies, demonstrating its relevance for understanding pedagogical innovation (Nikou, 2024).

2.1.1. Core Principles of Activity Theory

- **Activity as the Unit of Analysis**
  Learning is conceptualized as a purposeful interaction between subject and object, situated within cultural and historical contexts.
- **Mediation by Tools and Signs**
  Human action is mediated through cultural artifacts including language, symbols, and technologies which shape both the activity and the participants.
- **Hierarchical Structure of Activity**
  Activity comprises:
- Activities (driven by motives),
- Actions (goal-oriented processes)
- Operations (automatic routines shaped by context),
- Object-Orientation (The object of an activity whether conceptual or physical provides direction and meaning).
- Collective and Social Dimensions (Activities occur within communities and are guided by social norms and distributed roles).
- Development and Transformation (Activity systems evolve through internal contradictions, which drive learning, change, and innovation).

This theoretical framework is particularly appropriate for the current study, which examines how the Smartboard functions as a mediating tool within Saudi EFL classrooms. By viewing classroom learning as a socially mediated activity system, AT provides insight into how technological tools reshape learner engagement, instructional practices, and knowledge construction.

2.2. Past Research on Smartboards

Recent research by Alamari (2025) has examined teachers' perceptions of incorporating digital boards into vocabulary instruction for young learners. Using a quantitative online survey of 45 primary school teachers in international and private schools in Tripoli, the study found consistently positive attitudes toward the pedagogical value of digital boards. Teachers reported that such tools support vocabulary learning more effectively than traditional methods and enhance pupils' engagement during lessons. Interestingly, no significant differences emerged across demographic variables such as gender, age, or teaching experience. Overall, the findings highlight strong teacher enthusiasm for integrating digital boards, with many expressing willingness to use them more extensively in their classrooms.

Likewise, Gumede and Mavuru (2025) investigated that how different smartboard-supported modalities influence learners' attitudes in specialized skill-based courses. One study examined the effects of synchronous e-learning and face-to-face smartboard-based instruction on fashion design students' attitudes toward pattern-making, using a pretest–post-test control group design with 51 participants. Results from nonparametric analyses (Kruskal–Wallis and Mann–Whitney U tests) showed a statistically significant difference between groups, indicating that smartboard-supported teaching produced more favourable attitudes than traditional instruction. Moreover, students taught through face-to-face smartboard integration expressed markedly stronger positive attitudes than those who learned via synchronous e-learning. These findings affirm the pedagogical strength of interactive smartboard environments in promoting engagement and positive learner perceptions in practical design courses. Rahayu & Makmur (2024) investigated how interactive instructional boards particularly the ViewSonic model support the advancement of students' academic outcomes at Mohamed Bin Zayed University for Humanities by strengthening engagement, enriching conceptual understanding, and cultivating essential learning skills. Using a descriptive–analytical framework, the study first reviewed prior empirical work to establish its

conceptual foundation. It then adopted an inductive design through which a questionnaire was administered to 135 respondents, and the resulting data were examined using descriptive statistics and multiple linear regression to evaluate the proposed hypotheses. The analysis indicated that integrating interactive boards into instruction significantly enhances learning for both students and faculty, as evidenced by increased motivation, a stronger inclination toward innovation, and more dynamic collaboration between learners and instructors.

Although a substantial body of scholarship has explored Smartboards in educational contexts, much of this research has centred on teachers' perceptions, instructional practices, and classroom-level implementation. Far fewer studies have empirically investigated the measurable effects of Smartboards on performance-related outcomes in language learning. This gap is particularly noteworthy in the Saudi context, where learners frequently exhibit low motivation toward English language learning. Consequently, there remains limited empirical evidence regarding the extent to which Smartboard-enhanced instruction contributes to improving learners' motivation and achievement in Saudi ESL environments. Addressing this gap, the present study seeks to provide an evidence-based account of how Smartboard integration shapes learners' engagement with English tenses.

3. METHODOLOGY

The research adopted a quantitative research method to investigate the impact of Smartboard on the listening skills of ESL learners. It utilized a pre-test/post-test experimental framework, enabling a systematic comparison between groups exposed to traditional listening instruction and those engaged in Smartboard based listening activities. Data were analysed using SPSS (Version 27). To complement the quantitative findings, discussion section is also added while connecting it to the prior research

3.1 Population and Sampling

The target population comprised learners of ESL enrolled in Saudi Arabian public schools. Through purposive sampling, a total of 150 male students from the tenth grade were selected from various public schools across the western province of the Kingdom. While this sampling strategy allowed the researcher to focus on a specific learner profile aligned with the study objectives, it also introduced notable limitations:

- the exclusion of female learners, and
- the restriction of the sample to government schools only.

These constraints should be taken into account when interpreting the generalizability of the findings.

3.2. Research Tool

Smartboard was utilized as the primary instructional tool to determine its effectiveness in fostering listening comprehension.

Existing literature supports the reliability of the Smartboard in similar learning contexts. To establish content validity, listening chunks were selected from the official English syllabus mandated by the Saudi Ministry of Education. Both the experimental and control groups studied the same set of listening texts. The experimental group engaged with the material in digital format via Smartboard, while the control group used printed textbooks. The selected listening chunks were appropriate for mixed-ability learners, ensuring equitable access to the content for all participants.

3.3 Variables of the Study

This research incorporated two independent variables the Smartboard as an instructional approach and the listening content while learning outcomes functioned as the dependent variable. Several potential confounding factors were also identified, including teacher behaviour, learner intelligence, and demographic background. To reduce these threats to internal validity, only teachers with more than ten years of professional experience were involved in the study. All learners were native Arabic speakers studying English as a foreign language and belonged to the science academic track, contributing to relatively homogeneous intellectual profiles.

Moreover, several moderating variables were acknowledged, such as gender, ethnicity, age, previous academic achievement (Grade 9 examination results), classroom environment, teaching method, assessment format, lesson duration, and digital familiarity. Homogeneity was maintained as all participants were:

- male,
- Arabic,
- between 16 and 17 years of age,
- academically matched using previous English scores,
- exposed to identical classroom conditions,
- taught for 45 minutes per day, and
- assessed with standardized 25-minute listening tests consisting of three sections. Each contained a listening chunk of 3 minute and

five questions
- Classrooms were well-equipped, instruction was delivered exclusively in English, and all students exhibited adequate prior experience with digital tools, ensuring that technological unfamiliarity did not distort the results.

4. RESULTS

Quantitative results were derived from the statistical analyses conducted in SPSS, which included independent t-test for comparing performance within and between the control and experimental groups. Tables summarize the computed values for each group at baseline and at the end of the intervention. The dual-time-point comparison facilitated an evaluation of the learning progression attributable to the Smartboard-based digital listening intervention.

To confirm the statistical soundness of the inferential analyses, normality assessments were performed through skewness, kurtosis, and Shapiro–Wilk tests. Additionally, standard deviation values were examined to determine the extent of variability within and across the samples. Standard deviation

plays an essential role in understanding the spread of data, contributing key insights into distribution patterns and supporting the reliability of subsequent comparisons.

4.1. Examination of Initial Assumptions and Treatment Conditions

Before performing inferential tests to compare treatment effects, preliminary diagnostic checks were conducted. These involved:
- analysing skewness and kurtosis values to assess the normality of distribution,
- computing standard deviation to inspect data dispersion, and
- evaluating the overall alignment of the data with assumptions required for t-test procedures.

Standard deviation, widely used across empirical disciplines, served as a critical indicator of variability both within and between the control and experimental groups. Its incorporation ensured that the interpretation of mean differences was grounded in a robust understanding of sample distribution.

Table 1: Descriptive Statistics of Pre- and Post-Test Scores For Control And Experimental Groups (N = 75 Per Group).

Group	Test	M	SD	Skewness	Kurtosis	Shapiro–Wilk
C	Pre-test	6.15	1.17	0.41	0.63	0.91
	Post-test	7.25	1.14	0.21	0.21	0.92
E	Pre-test	6.19	1.21	-0.02	-0.58	0.94
	Post-test	9.10	1.39	0.31	-0.19	0.95

Summary:
1. M = Mean; SD = Standard Deviation; Skewness and Kurtosis assess distribution shape.
2. Shapiro–Wilk (SPWK) values > 0.05 indicate data normality. Skewness values within -2 to +2 suggest acceptable symmetry.
3. Data were further validated using a 5000-sample bootstrap method to ensure robust estimation of sample distributions.
4. CTLG = Control Group; EPLG = Experimental Group.

Description of table 1

The descriptive statistics for the pre- and post-test scores of the control (C) and experimental (E) groups. Key metrics include the mean (M), standard deviation (SD), skewness, and kurtosis for each assessment point. Additionally, Shapiro–Wilk (SW) values are reported to evaluate the normality of the data distribution. skewness values within the range of -2 to +2 are indicative of acceptable symmetry. The SW test results were non-significant for both groups, confirming that the data were normally distributed. To further ensure the robustness of the findings, all analyses were supplemented with a 5,000-sample bootstrap procedure, a widely recognized method for generating reliable estimates of sampling distributions. Overall, the descriptive statistics suggest a clear improvement in post-test performance for both groups, with a pronounced gain observed in the experimental group.

Table 2: Independent-Samples T-Test For Pre-Test Scores Of Experimental (E) And Control (C) Groups (N = 150).

Variable	E (n=75) M	(SD)	C (n = 75) M	(SD)	t (98)	P	95% CI	Cohen's d
Pre-test	6.15	(1.21)	6.19	(1.17)	0.10	.88	-0.21, 0.29	0.06

Table 2 presents the results of an independent-samples t-test comparing pre-test scores between the

experimental (E) and control (C) groups. The analysis revealed no statistically significant difference between groups, t (98) = 0.10, p = .88, with a 95% confidence interval for the mean difference ranging from -0.21 to 0.29. Effect size estimates, including Cohen's d, Glass's Δ, and Hedges' g, were all negligible (≈0.06), indicating that both groups were equivalent in their baseline English proficiency. These findings support the assumption of initial group comparability, ensuring that subsequent post-test differences can be attributed to the intervention rather than pre-existing disparities.

Table 3: Independent-Samples t-Test for Post-Test Scores of Experimental (E) and Control (C) Groups (N = 150).

Variable	E (n = 75) M	(SD)	C (n = 75) M	(SD)	t (98)	p	95% CI	Cohen's d
Post-Test	9.10	(1.39)	7.25	(1.14)	24.10	.001	3.10, 4.10	2.12

Table 3 presents the results of an independent-samples t-test comparing post-test scores between the experimental (E) and control (C) groups. The experimental group exhibited a markedly higher mean score (M = 9.10, SD = 1.39) compared with the control group (M = 7.25, SD = 1.14). The assumption of homogeneity of variance was met, as indicated by an F-value of 1.32, p > .05, confirming that the variance of scores across groups was consistent. The t-test analysis revealed a statistically significant difference, t (98) = 24.10, p < .001, with a 95% confidence interval for the mean difference ranging from 3.10 to 4.10. The absence of zero in this interval supports the statistical significance of the observed effect.

Effect size calculations demonstrated a substantial impact of the intervention. Cohen's d was 2.12, indicating a very large effect according to Cohen's (1988) benchmarks. Similarly, Glass's Δ and Hedges' g yielded values exceeding 7, further corroborating the pronounced difference between groups. These findings suggest that the Smartboard based listening intervention produced a dramatic improvement in listening performance for the experimental group relative to traditional instruction, underscoring the efficacy of the intervention tool in enhancing learners' outcomes.

5. DISCUSSION

The findings of this study demonstrate that the smartboard significantly enhanced learners' listening comprehension skills. The improved performance of the experimental group can be attributed to the tool's ability to generate human-like instructional

responses through a multi-stage process of pre-processing, encoding, decoding, and post-processing (Hatfield, 2025). Listening comprehension exercises are particularly challenging for second and foreign language learners. However, smartboard has the facility to summarize, synthesize and provide various techniques like tailored practice texts according to the learners' level (Xu, (2025). This facility was utilized by the learners in this research which improved their listening.

Moreover, the scaffolded input aligned with learners' proficiency levels, giving the experimental group a clear advantage. This result supports Alamari (2025) who emphasized the effectiveness of Smartboards in strengthening English listening skills validated by the opinions of the teachers.

A key feature explored in this study was Smartboar's capacity to deliver repeated, personalized listening chunks. Learners were able to practice with varied techniques and it created harmony and swift comprehension. Gradually becoming familiar with responding to comprehension questions. Additionally, its AI-generated feedback reviewed and clarified by teachers enhanced the learning experience by ensuring that explanations remained accurate and comprehensible. The tool also played an important role in vocabulary development by providing synonyms, contextual antonyms, and simplified meanings, confirming Gumede and Mavuru (2025) assertion that for successful performance and digital tools should be integrated vigorously.

Beyond the understanding of vocabulary, accent and important information support, Smartboard exposed learners to cultural references, tone, and textual nuances, thereby broadening their interpretive skills. The personalized options increased students' listening stamina by offering materials of varying genres and difficulty levels, which expanded their focus and concentration. This observation aligns with Alsaied et al. (2025) who found that listening stamina improves through continuous exposure to diverse texts by smartboard. Furthermore, Smartboard's ability to summarize key ideas helped students identify main points and contextual relationships within passages, echoing Rahayu and Makmur (2024), who highlight the importance of summarization in fostering comprehension and analytical reasoning. Collectively, these multi-dimensional features from vocabulary support to improved focus and comprehension explain the substantial gains observed in the experimental group.

The study also aligns closely with the Activity

Theory (AT) which shared that learning and development emerge through dynamic, goal-directed interactions between subjects (individuals or groups) and objects (the motives or goals they pursue). The results in this study were the outcomes of various prompts and activities dipped in the culture of innovation and modernity. AT also shared that there is a shift from isolated mental processes to the broader networks of cultural tools, social structures, and historical conditions that shape human practices. Further the sense of collaboration through Smartboard, the versatility of activities and learning creativity also aligned learners to perform multiple activities inside the classroom. Sy et al. (2025) also shared that AT it is particularly valuable for exploring how digital tools mediate learning and transform classroom dynamics. It further helps to analyse deeply and mediate by using tools.

Overall, the findings resonate with previous research by Nikou (2024), Walter and Tiwari (2025), and Fuller (2025) who concluded that Smartboard is a productive and pedagogically valuable tool within the EFL classroom. The present study extends this body of evidence by demonstrating that when a Smartboard is effectively supervised and ethically integrated, it can substantially elevate learners' listening comprehension skills.

6. CONCLUSION

This study demonstrates that Smartboard holds significant potential as a transformative tool for language acquisition, particularly in the context of listening comprehension. Using a controlled experimental design, the study compared two groups of Saudi Arabian ESL learners: one taught solely through traditional instruction and another that integrated Smartboard alongside conventional teaching methods. Over a three-week instructional period, both groups engaged with identical listening materials and classroom tasks. At the end of the intervention, a standardized listening comprehension assessment and follow-up interviews were administered to evaluate the effectiveness of Smartfood-enhanced instruction.

The results showed a substantial improvement in the listening proficiency of learners who used Smartboard in conjunction with traditional pedagogy. Quantitative findings indicated statistically significant gains for the experimental group. Learners' performance exhibited that Smartboard improved their understanding of texts, grammar accuracy, vocabulary retention, engagement, independence during learning, and overall confidence. Collectively, these findings

highlight Smartboard's promise as an AI-driven educational tool capable of meaningfully augmenting ESL instruction. As AI integration in pedagogical practice continues to expand globally, such tools represent a promising pathway for enhancing both language proficiency and learner experience.

6.1. Limitations

Although the study produced encouraging results, several limitations must be acknowledged.

1. Sample Characteristics: The participants were restricted to a single gender, nationality, and educational level, which limits the generalizability of the findings.
2. Short Intervention Period: The instructional period lasted only three weeks, providing limited insight into the long-term impact of Smartboard on listening development.
3. Single Institutional Context: Because the study was conducted in one school using one curriculum, external factors such as teaching style or school culture may have influenced results.
4. Reliance on Self-Report: While interviews provided valuable insights, self-reported data may be susceptible to bias, including overestimation of positive experiences.

These constraints suggest that caution should be exercised when generalizing the results to broader populations or educational settings.

6.2. Recommendations For Future Research

In light of the limitations, several recommendations are proposed to guide future investigations:

1. Diverse Samples: Future studies should include participants of different genders, nationalities, and educational stages (e.g., primary, intermediate, secondary, and university levels).
2. Extended Study Duration: Longitudinal research is needed to determine whether Smartboard produces sustained improvements in some other language skills proficiency.
3. Cross-Cultural Comparisons: Replicating the study in different countries and cultural contexts would provide insights into the global applicability of AI tools in language learning.
4. Comparative AI Studies: Future work could compare Smartboard with other AI language tools to determine relative strengths and instructional benefits.

5. Teacher Training Integration: Exploring how teacher preparedness and training influence AI integration could further illuminate effective implementation strategies.

6.3. Pedagogical Implications

The results of this study carry several meaningful implications for educators, curriculum designers, and policymakers:

1. Enhanced Personalized Learning: Smartboard can supplement the classroom by delivering individualized listening passages, vocabulary scaffolding, and tailored feedback, supporting differentiated instruction.
2. Improved Learner Engagement: AI-based tools can increase motivation through interactive features, adaptive prompts, and instant feedback, making listening more appealing for ESL learners.
3. Support for Vocabulary and Comprehension: By providing synonyms, explanations, contextual cues, and summaries, Smartboard can strengthen foundational skills essential for listening chunks.
4. Teacher–AI Collaboration: The study highlights the importance of combining teacher oversight with AI support. When teachers monitor and refine AI-generated content, learning becomes both accurate and pedagogically sound.
5. Integration into Curriculum: With proper training and ethical guidelines, Smartboard can be incorporated into listening programs, homework assignments, remedial instruction, and independent study tasks

REFERENCES

Alamari, F. A. (2025). Libyan teachers' perspectives on employing digital boards for active learning to improve primary school pupils' vocabulary acquisition. Africa University Journal of Scientific Research, 19(1), 310-334.

Alhumsi, M. H. (2024). Revolutionizing EFL Instruction: Jordanian Teachers' Perspectives on Interactive Whiteboards for Word Identification Enhancement. Journal of Intercultural Communication, 24(2), 70-81.

Ali, M. M. (2024). Zoom on the Boom: A Perspective of South East Asian ESL Teachers after Covid-19 Situations. In Innovative Pedagogical Practices for Higher Education 4.0 (pp. 177-192). CRC Press.

Ali, M. M. (2024). Technology-based teaching and learning in Pakistani English language classrooms. CRC Press.

Ali, M. M. (2024). Technology-based teaching and learning in Pakistani English language classrooms. CRC Press.

Ali, M. M., Imran, M., Khan, R., Sami, A., & Ali, Y. A. (2025). FROM LANGUAGE CLASSROOMS TO STEAM DISCIPLINES: THE IMPACT OF AI-DRIVEN STEAM LEARNING ON STUDENTS'COMMUNICATIVE PROFICIENCY. Lex Localis, 23(10), 750-764.

Alqahtani, N. (2025). The Role of English in Implementing the Saudi Vision 2030 Programme: A New Educational and Linguistic Trend. In Language Education in Saudi Arabia: Challenges and Opportunities in Language Pedagogy and Policy (pp. 53-71). Cham: Springer Nature Switzerland.

Al-Qaimari, G., & Khan, M. A. (2025). Strategic Planning for Higher Education Institutions: Modern Challenges and Global Perspectives.

Al-Qirim, N., Rouibah, K., Serhani, M. A., Khalil, A., Tarhini, A., Maqableh, M., & Gergely, M. (2020). Smart Board Technology in Higher Education Institutions. In Encyclopedia of Education and Information Technologies (pp. 1500-1512). Cham: Springer International Publishing.

Alsaied, M. A., Ourkia, A., Mechenene, M. O. I., & Farag, H. H. A. (2025). The Impact of Interactive Smart Boards on Students' Achievements, Motivation and Skill Acquisition at Mohamed Bin Zayed University for Humanities. Educational Process: International Journal, 18, e2025520.

Alsaied, M. A., Ourkia, A., Mechenene, M. O. I., & Farag, H. H. A. (2025). The Impact of Interactive Smart Boards on Students' Achievements, Motivation and Skill Acquisition at Mohamed Bin Zayed University for Humanities. Educational Process: International Journal, 18, e2025520.

Bay, D. N., & Hartman, D. K. (2025). Digital Technology in Kindergarten: Kindergarten Teachers' Practices and Their Effects on Children. Journal of Research in Childhood Education, 1-29.

Fuller, M. (2025). Effective Digital and Online Pedagogies. In A Guide to the Diploma in Teaching and Related Qualifications (pp. 171-196). Routledge.

Gumede, E. N., & Mavuru, L. (2025). Teachers' Understandings and Practices of Using Smartboards as Digital Tools to Teach Grade 12 Life Sciences Genetics. International Journal of Learning, Teaching and Educational Research, 24(5), 323-338.

Hatfield, J. L. (2025). From chalkboard to smartboard: an exploratory study of experienced teachers' perspectives on student generations X, Y, Z and Alpha. Education and Information Technologies, 1-53.

Luo, Z., Tan, X., He, M., & Wu, X. (2023). The seewo interactive whiteboard (IWB) for ESL teaching: How useful it is?. Heliyon, 9(10).

Minor, M., Losike-Sedimo, N., Reglin, G., & Royster, O. (2013). Teacher technology integration professional development model (SMART BOARD), pre-algebra achievement, and Smart board proficiency scores. SAGE Open, 3(2), 2158244013486994.

Mormah, F. O. (2024). INTEGRATING SMART BOARDS AND COMPUTERS INTO TEACHING METHODOLOGIES FOR ENHANCED EDUCATIONAL MANAGEMENT AND STUDENT LEARNING IN DELTA STATE. Journal of Association of Educational Management and Policy Practitioners, 6(2), 302-310.

Ndwandwe, K. P., Ramaligela, S. M., & Mtshali, T. I. (2024). The effectiveness of smartboards in enhancing technology teachers' creativity. African Perspectives of Research in Teaching and Learning Journal, 1(8), 1-9.

Nikou, S. A. (2024). Student motivation and engagement in maker activities under the lens of the activity theory: A case study in a primary school. Journal of Computers in Education, 11(2), 347-365.

Rahayu, M. A., & Makmur, A. (2024). The effectiveness of using smartboard interactive toward learning innovation in schools. JIV-Jurnal Ilmiah Visi, 19(1), 23-31.

Somyürek, S., Atasoy, B., & Özdemir, S. (2009). Board's IQ: What makes a board smart?. Computers & Education, 53(2), 368-374.

Sy, M. P., Godoy-Vieira, A., Pineda, R. C., & Farias, L. (2025). Unpacking the middle-class worldview in occupational science using cultural-historical activity theory. Journal of Occupational Science, 32(4), 739-756.

Walter, P., & Tiwari, K. (2025). Impact of inclusion of smart board technology in classroom: An experimental study. In Advances in Science, Engineering and Technology (pp. 266-269). CRC Press.

Warner, B. (2025). Edtech for Multilingual Learners: 48 Fun and Flexible Activities for Every Classroom. ASCD.

Xu, L. (2025). Navigating the educational landscape: The transformative power of smart classroom technology. Journal of the Knowledge Economy, 16(2), 10389-10420.

Yalman, M., & Basaran, B. (2021). Examining PRESERVICE teachers' use of SMARTBOARD and pc tablets in lessons. Education and Information Technologies, 26(2), 1435-1453.

Yang, Y., & Li, J. (2025). Unleashing English Learning in Chinese Primary Schools: How IWBs Transform the Classroom. The Educational Review, USA, 9(5).

Yousef, J., Ibrahim, M. K., Alsalhi, N. R., Alqawasmi, A. A., & Ahmed, A. (2024). Utilizing AI-Driven Virtual Training Platforms to Enhance Smart Board Skills among English Language Teachers. Eurasian Journal of Applied Linguistics, 10(3), 173-182.

Zhang, Y., & Liu, Y. (2025). Tame the beast of ChatGPT: developing design principles to strategically integrate ChatGPT into EFL writing through an activity theory perspective. Computer Assisted Language Learning, 1-30.