

IMPACT OF *KAHOOT* ON VOCABULARY ACQUISITION AND CLASSROOM ENGAGEMENT OF ESL LEARNERS AT ELEMENTARY LEVEL

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Abstract

Game-based learning has become a growing topic of interest as a useful method of instruction in the context of digital education. One of the most used learning systems in the learning sector is Kahoot which has been attributed to high levels of student engagement and learning. However, most empirical studies are conducted in a place of higher education where there is a scarcity of quasi experimental data on its multidimensional effects on elementary ESL students, especially in developing countries, like Pakistan. The key aim of this research was to illustrate how Kahoot-based teaching affected four main learning outcomes Vocabulary retention, reading comprehension, motivation, and classroom engagement in a sample of elementary ESL students in Pakistan. Quasi-experimental, non-equivalent group, pre-test-post-test design was used. The participants were a group of seventy students of the fourth grade, who were randomly divided into the experimental group (Kahoot-based instruction) and the control group (traditional instruction). The intervention was a six-week intervention; the average curriculum was used to provide the instructions with the additional Kahoot activities in the case of experimental group. Data was gathered with the help of pre- and post-tests of vocabulary and reading comprehension, Likert-scaled questionnaires that measured motivation and engagement, organized classroom observations, and Kahoot analytics. The independent-samples t-tests, paired-samples t-tests and the analysis of covariance (ANCOVA) were used in statistical analyses that would determine the effects of the instructional modality. Findings indicate that use of Kahoot-based instruction was found to have achieved substantial improvements in cognitive, affective, and behavioral attainments in elementary-level ESL students in Pakistan. The findings confirm the usefulness of gamified, retrieval-based learning tools and assist in the systematic implementation of such resources in education with the limitation of resources.

Keywords: Kahoot-based instruction; gamification; vocabulary retention; reading comprehension; elementary ESL; classroom engagement

1. Introduction

Digital change is continuing to transform modern education systems, with technology becoming a key variable of pedagogical innovation. Across global contexts, educational institutions are integrating digital ecosystems that promote learner-centred instruction, personalization, and adaptive feedback mechanisms (Bond et al., 2024; Nguyen et al., 2024; Chung et al., 2025). The transition to digitally mediated learning is also representative of the paradigm changes in education towards wider reforms as supported by Education 4.0 and imminent Education 5.0 discourses of collaboration, innovation, and technological fluency (Daniel et al., 2024; Hakami and Al-Harbi, 2025). In this context, game-based learning (GBL) has been developed not only as a set of supplementary activities but also as an organization of learning based on the principles of motivational and cognitive theory (Martínez-García et al., 2024; Castillo-Morales et al., 2024).

Gamification integrates elements such as points, leaderboards, immediate feedback, and time-based challenges to enhance cognitive activation and learner persistence (Chen et al., 2024;

Rivera-Reyes et al., 2024). The meta-analytic results show that gamified instruction may have a positive impact on engagement and acute academic outcomes in a wide variety of academic fields (Aibar-Almazan et al., 2024; Castillo-Morales et al., 2024). Such mechanisms coincide with the principles of retrieval practice and reinforcement which enhance the strengthening of the long-term memory consolidation (Butler & Roediger, 2024; Pramono & Yoenanto, 2024). Recent neuroscience-informed research further suggests that reward-based digital learning environments may activate motivational pathways associated with sustained attention and persistence (Li & Han, 2024; Xu & Chen, 2025).

Gamified instruction has a pedagogical importance especially with English as a Second Language (ESL) instruction. In language acquisition, repetition of exposure, practicing of retrieval and the simulative learning conditions involving emotion support are required. It has been empirically established that gamified teaching of ESL can lead to a better working vocabulary, reading skills, and the confidence of the learner (Chan & Lau, 2025; Ibrahim & Saleh, 2024). Moreover, reductions in foreign language anxiety have been observed in interactive digital environments where participation occurs in low-stakes, feedback-rich contexts (Chen & Zhu, 2024; Ibrahim & Omar, 2025).

Among widely adopted GBL platforms, Kahoot! is an example of a popular GBL tool with global recognition as a quizzing and formative assessment platform used in real time. The systematic reviews support that Kahoot-based teaching is linked to higher motivation, engagement, and short-term learning outcomes (Castro & Tumibay, 2024; Stefanovic & Mihaljevic, 2024). The design elements included in it, such as speed-of-questioning, competition-based scoring, and feedback in the form of multiple modalities, comply with the cognitive activation theory and self-regulated learning processes (Hadwin & Järvelä, 2024; Mayer, 2024). Additionally, classroom-based studies report improvements in socio-emotional interaction and cooperative competition when Kahoot is implemented in language learning settings (Ahmed et al., 2025; Park & Sun, 2025).

Despite that the world is becoming more scholarly; the success of gamified platforms is situation specific. Although the improvement in technologically advanced educational systems has been reported, there is less literature describing their effects in the developing settings due to instructional and pedagogical limitations (Singh & Dogra, 2024; Riasat et al., 2025). Foundational English literacy is still an issue in Pakistan. National assessments report indicate the low proficiency levels in vocabulary retention and reading comprehension among primary-grade learners (Pakistan National Education Assessment, 2023; Farooq & Shabbir, 2025). Most elementary classrooms, through instructional practices, continue to be teacher-centered, which, in most cases, restricts active engagement and communicative practice (Tariq & Ahmad, 2024; Mahmood et al., 2024).

Even though digital integration continues to grow at a slow pace, the local research works mostly deal with the studies of higher education and technology acceptance but fails to record quantifiable learning outcomes (Arif et al., 2024). Besides, there are few empirical studies of gamification in elementary schools, especially those that utilize quasi-experimental designs that can measure cognitive, affective, and behavioral outcomes concurrently. Current global literature emphasizes the need to develop vocabulary early in life that leads to future academic performance and reading comprehension patterns (He et al., 2024; Aziz et al., 2023). Nevertheless, the available empirical data about the ability of gamified tools, like Kahoot, to promote the presence of these core competencies in Pakistani primary classrooms are not yet sufficient.

The literature thus reveals two interconnected gaps. First, not many studies have investigated the multidimensional effects of Kahoot on vocabulary recall, reading comprehension, motivation, and classroom behavior by elementary ESL learners in emerging settings. Second,

there is little research that incorporates a combination of cognitive, affective, and behavioral outcome variables into one empirical platform based on quasi-experimental comparison. These gaps restrict the ability of educators and policymakers to evaluate the pedagogical value of gamified interventions in early language education. This is one of the needs that should be addressed because early literacy skills are indicative of lifelong achievement, academic success, and socio-economic mobility (Ali & Rahman, 2022). Provided the gamified means of instruction can enhance the basic level of knowledge of English in resource-limited environments, the implications go beyond the levels of engagement to the systemic change in education.

Accordingly, the present study investigates the effectiveness of Kahoot-based instruction in improving vocabulary retention, reading comprehension, learner motivation, and classroom engagement among elementary ESL students in Pakistan. Employing a quasi-experimental mixed-method design (Creswell & Creswell, 2024) The study employs a quasi-experimental mixed-method design (Creswell and Creswell, 2024) in comparison, which involves results of students who get Kahoot-based instructions and the group who are taught using traditional teacher-centered methods. This study offers a valid contribution to the body of research on gamification as it evaluates the same cognitive, affective, and behavioral dimensions simultaneously, placing it outside the sphere of the pre-perception-based research on gamification thus contributing the context-specific evidence into the scholarly domain of digital language pedagogy.

2. Literature Review

2.1 Game-Based Learning and Gamification in Language Education

Game-Based Learning (GBL) is conceptualized as a systemic combination of pedagogical verbal material with gameplay to support both cognitively mediated and affectively mediated learning activities (Nehring et al., 2023; Martinez-Garcia et al., 2024). Until now, contrary to the conservative teacher centred methodology, GBL places the process of learning in the form of an iterative and feedback-based process with the learners being actively involved in the learning process in terms of challenge, repetition and purposeful interaction. In this framing, learning is no longer linear delivery of information but recursive in nature, where there are an attempt, feedback, correction, and consolidation, which are also consistent with practices of retrieval learning and multimedia learning (Mayner, 2024).

On the cognitive perspective, GBL is based on the dual-coding theory and reinforcement principles to improve the encoding and memorization (Qi and Zhang, 2025). The concomitant presentation of visual and verbal stimuli reinforces the associative memory networks especially in the case of elementary learners whose abstract reasoning abilities are at an early stage. Also, gamified systems have time-bound challenges, which encourage retrieval fluency that has been proven to facilitate permanent vocabulary consolidation (Butler and Roediger, 2024). Nonetheless, although many studies have had positive short-term benefits, comparatively lower in number have separated effects of more profound semantic processing and larger surface-level repetition impacts. This difference is not well studied in the elementary ESL set-ups.

Gamification is a term applied to mean the use of separate aspects of games, such as points, leaderboards, badges, and time tests (also known as timed responses) in otherwise traditional forms of instruction (Sailer and Homner, 2023). It is theoretically explained by behavioral models which determine its effect by implementing stretched cycles of determinations influencing persistence and accuracy (Ahn et al., 2023). However, there is no consensus as to how far the extrinsic rewards would lead to a prolonged intrinsic motivation. Behavioural persistence and cognitive depth are not well operationalized because affective engagement has been suggested to be dopamine-mediated to attentional control (Li and Han, 2024; Xu and Chen, 2025) while the motivations are measured with self-report surveys only. The application

of gamified instruction in the ESL context has been related to fewer anxiety levels in language and higher engagement in communication (Ibrahim and Saleh, 2024; Park and Sun, 2025). However, this evidence is mostly derived on secondary and tertiary populations in environments that are technologically constant. The relevance of these results to elementary education topics in emerging educational systems, in which infrastructural and teaching limitations influence teaching practice, has not been explored in depth (Mahmood et al., 2024; Riasat et al., 2025).

2.2 Kahoot as a Formative Gamified Assessment Environment

Kahoot is one of the popular digital information platforms that operationalize gamification using real-time quizzing, visual audiovisual stimulation, and competitive scoring. It converts the formative assessment into two-way engagement which involves quick-response cycles and instant feedback (Castro and Tumibay, 2024; Stefanovic and Mihaljevic, 2024). In a cognitive context, Kahoot may be perceived as a retrieval-based evaluation tool which enhances consolidation of its memories with recurrent recalling along time limitations (Butler and Roediger, 2024).

The approach of the platform is multimodal, which is consistent with the multimedia theory of learning and makes it easier to combine textual, visual, and auditory. Immediate corrective feedback will facilitate metacognitive regulation because it helps learners to monitor and correct comprehension on a real time basis. Nevertheless, most of the empirical studies contrast engagement or enjoying it instead of disaggregating the cognitive processes underlying the performance increase. Moreover, brief periods of interventions prevail in the literature, and this causes doubt on stability of learning outcomes. Regarding the affective component, Kahoot transforms the process of evaluation into low-stakes-level gameplay thus decreasing the level of performance anxiety (Chen and Zhu, 2024; Ibrahim and Omar, 2025). This anonymity of the device-based responses will alleviate the fear of error in the face of the crowd, which is especially circumstantial in ESL classrooms where the level of communicative confidence is a decisive factor in participation. However, the studies hardly separate the effects of the reduced anxiety because of gamified format and the reduced anxiety because of collective participation, and therefore the causal route remains become understudied.

2.3 Vocabulary Retention in Gamified ESL Contexts

Vocabulary acquisition is an essential part of ESL competence, based on which reading comprehension and communicative efficiency occurs (Zhu and Au, 2023). Lexical development can only be achieved through repetition of retrieval, acquisition in context and semantic elaboration. Vocabulary learning in many Pakistani classrooms is based on extensive memorization and translation exercises, both of which usually fail to produce in-depth processing and retention (Hashim et al., 2024). Kahoot incorporates the process of retrieval practice in learning that involves the form of competitive learning and could reinforce orthographic recognition and semantic mapping (Pramono&Yoenanto, 2024). Multimodal supports help in the support of dual coding as well as context recall (Qi and Zhang, 2025). Although both empirical research and studies have shown better vocabulary performance with gamification settings (Aibar-Almazan et al., 2024; Park and Sun, 2025), most studies measure instantaneous post-test improvement. There is a paucity of literature on sustained retention or adjusting/matching on baseline proficiency disparity among elementary students in resource deprived settings (Farooq and Shabbir, 2025). Also, vocabulary results are frequently operationalized in the improvement of raw scores without examining depth of lexical knowledge (e.g. productive or receptive vocabulary). This limitation of the methodology does not allow concluding on the qualitative character of vocabulary development by means of gamified teaching.

2.4 Reading Comprehension and Cognitive Integration

Reading comprehension encompasses the decoding, inference production, as well as textual information integration into meaningful mental constructions. In young ESL learners, mediated comprehension is manifested by low vocabulary, low exposure, and the formation of inferential abilities (Zhu and Au, 2023). Old fashioned comprehension training often focuses on the teacher explaining and textbook questioning and inhibits the involvement of active interpretation. Kahoot gets rid of comprehension exercises by breaking them down in small interactive quizzes. Immediate feedback leads to the development of metacognitive awareness whereas, timed inferential questioning augments attention (Mayer, 2024; Maraza-Quispe et al., 2024). Nevertheless, it is common research to confound enhanced participation and enhanced comprehension, without separation of inferential reasoning or level of integration into distinct constructs. In addition, measures of understanding more often use brief multiple-choice tests, which cast doubt on construct validity. It is not sufficiently explored whether gamified environments yield greater textual assimilation or just recognize based accuracy, especially in elementary ESL institutional environments.

2.5 Motivation, Engagement, and Classroom Behavior

Motivation and engagement are multidimensional constructs that have cognitive, emotional, and behavioral persistence in them (Kim and Castelli, 2023). Gamified applications could help to increase intrinsic pleasure and at the same time utilize extrinsic reinforcement loops (Ahn et al., 2023). Attentional control has been found to persist on emotional arousal (Li and Han, 2024) but is commonly measured by self-report methods and tools instead of observing behavior. The accumulating engagement peaks are created by Kahoot through its structured reward systems (Castillo-Morales et al., 2024). The collaborative modes can lead to discipline in the classroom (Ahmed et al., 2025). Nevertheless, there remains limited research that studies on-task behavior and patterns of attention or interactive dynamics in the classroom in the context of developing conditions with teacher-centred norms (Mahmood et al., 2024).

2.6 Technology Integration in Developing Educational Contexts

The spread of digital transformation in education is still uneven in the developing countries. The successful implementation is not supported by infrastructure constraints, unpredictable access, as well as scanty teacher training (UNESCO, 2024; Riasat et al., 2025). Interactive innovation is also additional constrained in Pakistan due to the exam-orientation of the curricula and the high levels of rigidity in instruction (Tariq & Ahmad, 2024). Even though cheap digital enhancements show the potential of engagement (Singh and Dogra, 2024), little empirical data underlies the proposed contextual moderators and language measurements. Not many research works use the quasi-experimental design that can separate the influence of instruction and variability of the environment.

2.7 The Present Study

Collectively, the body of literature suggests that there are positive relationships between gamified teaching and learning outcomes, however, they also reveal (a) lack of concentration on elementary ESL learners; (b) lack of environmental-specific findings in developing contexts; (c) overreliance on short term outcomes or perception-based results; and (d) underrepresentation of cognitive, affective, and behavioral constructs into one analytical orienting system.

1. Based on these gaps, this paper will assess the multidimensional effect of the Kahoot-based instruction in Pakistani elementary ESL classrooms. In particular, the research questions considered in the study are as follows:
2. What is the extent of the effect of using Kahoot on the engagement of students, motivation, and interest in English language classes in the elementary level?
3. How does Kahoot based teaching impact the vocabulary retention of young ESL students?

4. What is the efficiency of Kahoot in facilitating the reading comprehension performance of students?
5. What is the effect of using Kahoot integrated in the classroom in terms of participation, attention and learning dynamics?
6. Do learners taught by use of Kahoot as an instructional technique have a considerably better overall achievement in English language as opposed to learners taught by use of traditional approaches?
7. What are the peers of teachers regarding the pedagogical utility, limitations and the possibility of using Kahoot in elementary English classrooms?

3. Methodology

3.1. Research Design

The current research took a quasi-experimental non-equivalent group pre-test-post-test design to investigate the impact of the instruction of the English language using Kahoot on the outcome of the Pakistani elementary learners. It was impossible to assign the participants randomly because of the institutional and administrative difficulties related to the school environment where the students are placed in intact classrooms at the onset of the school year. Thus, two intact classes were selected and put at the experimental and control condition. The two groups were evaluated using the same instruments both prior to the intervention and after it. The inclusion of pretest measures enabled setting baseline equivalence and gave statistical control over the possible selection bias. The intervention was six weeks, during which the experimental group was taught using Kahoot and the control group was taught using a traditional teacher instruction. The rest of the instructional variables, such as syllabus, lesson objectives, classroom environment, assessment criteria, instructional time and teacher; were kept similar within and across groups to isolate the impact of instructional modality.

3.2. Participants and Sampling

Students of elementary level in the Army Public Schools (APS) in Bahawalpur, Punjab, in Pakistan were used as the target. The sample included 70 female education students in the two classes in the 4th grade. A total of 35 students were used as the experimental group and 35 students as the control group. Institutional gender-segregation policies and not the choice of the researcher determined the all-female sample. Despite this restricting extraneous generalizability, it is more internal consistency controlling the effect of variation in classroom behavior and engagement patterns based on gender. Multi-stage process of sampling was embraced. To choose the school and grade level, first, purposive sampling according to the alignment with the curriculum was applied, and also the cooperation of the administration and the availability of the technology necessary to implement Kahoot. Cluster randomization was then used to sort intact classrooms to both experimental and control groups. Besides the students who participated in the research, 40 experienced elementary English teachers also took part in research instrument validation. Such teachers failed to provide information to the experimental analysis but report expert judgment to content validity.

3.3. Variables of the Study

The independent variable was the use of Kahoot as a digital instructional platform of a game-based learning in the English language teaching. The conceptualization of Kahoot was the systematic application of interactive quizzes that included the use of time-based questions, competitive scoring, multimedia, retrieval task, and instantaneous feedback. Cognitive, affective and behavioral outcomes were the dependent variables. Intellectual performance was the vocabulary retention and reading comprehension. Vocabulary retention was categorized as given the capability of the learners to identify, remember and use target lexical items as time goes by. Reading comprehension was an aspect that involved understanding written texts on literal, inferential and evaluative levels by the learners. Affective variables were the motivation,

enjoyment, and language anxiety. Behavioural variables were classroom involvement, classroom participation, classroom attentiveness, and teamwork behaviour. The control variables were instructional material, length of the lesson, instructor, classroom, academic schedule, and testing processes. By keeping consistency on these factors, internal validity was enhanced by minimizing extraneous influences.

3.4. Data Collection Instruments

The various instruments were utilized to achieve triangulation and complete measurement of data using several quantitative instruments. Curriculum based pre-test and post test, which included multiple choice, matching, and context question items, were used to determine vocabulary retention. The comprehension was assessed in reading through the short passages to be read followed by literal, inferential, and evaluative questions in accordance with the grade levels. Rating of the motivations and enjoyment was performed using a structured Likert-scale questionnaire based on the ARCS Motivation Model by Keller that included attention, relevance, confidence, and satisfaction. A multidimensional engagement scale that addressed behavioral, emotional, and cognitive aspects was used in measuring classroom engagement. An adapted version of the Foreign Language Classroom Anxiety Scale (FLCAS) was used to measure language anxiety among the learners (young learners). The engagement behavior was documented with the help of the structured classroom observation checklist that evaluates attentiveness, interaction with peers, collaboration, and frequency of participation. As well, Kahoot platform analytics, such as accuracy of responses, response time, and attendance rate of the experiment, offered objective behavioral data to the experiment.

3.5. Validation and Reliability

Face and content validity were determined by an examination by 40 experienced elementary English teachers. Scholars have tested instrument clarity, developmental appropriateness, alignment with the curriculum and representation of constructs. According to the feedback, some changes were introduced to wording and sequence of items. Pilot study was performed on a group of 15 female students on the fifth grade in the same institutional context not part of the main study. The pilot evaluated the clarity of the instruments, the feasibility, the time when it should be administered, and how it should be implemented in a classroom. Cronbach alpha was calculated in SPSS to measure internal consistency reliability. The 33-item questionnaire produced a coefficient of Cronbach of good internal consistency of 0.990. They did not remove any items because the results were high in reliability.

3.6. Intervention Procedure

The intervention was carried out in six successive weeks when regular English classes were received. The experimental group took part in organized instructional lessons in Kahoot based on the reinforcement of vocabulary and reading compliant instructional assignments. The sessions included retrieval practice, repetition, competitive and instant feedback factors. Working was done individually and in groups to encourage interaction and participation. The control group was taught the same curricular material in same usual way that employed traditional methods in terms of teacher explanation, textbook reading, oral questioning and written exercises. The same teacher was to instruct both groups so that there would be a uniformity in instruction. The only variable that was manipulated was the instructional modality, and the instructional time and the goal of the lesson did not differ between groups.

3.7. Data Collection Procedures

Data collection was done in three stages. In the baseline stage, both groups were pre-tested and some initial observations in the classroom carried out. The implementation of instructional activities was done during the intervention and Kahoot analytics were gathered in the case of the experimental group. During the post-intervention phase, standardized classroom condition

and post-tests, questionnaires and end of classroom observations were conducted to guarantee consistency in measurement.

3.8. Data Analysis Strategy

The SPSS version 26 was used to analyze data. Mean and standard deviations were used as descriptive statistics to draw a picture of performance trends. Paired-samples t-tests were done to discuss within-group pre-to post-test differences. Post-test group differences were compared with independent-samples t -tests. Analysis of covariance (ANCOVA) was employed where needed as it attempted to control factors at baseline and enhance causation. The practical significance was determined with the help of Cohen d. A $\alpha = .05$ was chosen as a level of statistical significance.

3.9. Ethical Considerations

Interim school administration approval was taken. Before consent was obtained, parental and student assent were acquired. Respondents volunteered to participate and confidentiality was ensured by coding identifiers. All data was stored in safe places and only used in research. Transmission of control group to the Kahoot-based activities after the study was completed so that the control group received the same instructional opportunity.

4. Results

This section presents the statistical findings of the quasi-experimental investigation examining the impact of Kahoot-based instruction on elementary ESL learners. The analysis integrates achievement test results, questionnaire data, Kahoot analytics, and classroom observations to provide a comprehensive evaluation of cognitive, affective, and behavioral outcomes. All analyses were conducted using SPSS Version 26. Statistical significance was set at $p < .05$, and effect sizes were calculated to determine practical significance.

4.1 Preliminary Analyses

4.1.1 Reliability of Instruments

Internal consistency reliability was assessed using Cronbach's alpha. All constructs exceeded the recommended threshold of .70, demonstrating strong psychometric robustness.

Table 1. Reliability Coefficients of Questionnaire Constructs

Construct	Items	Cronbach's Alpha (α)	Reliability Level
Motivation & Enjoyment	5	0.91	Excellent
Engagement & Participation	5	0.89	Excellent
Vocabulary Retention	5	0.93	Excellent
Reading Comprehension Support	5	0.90	Excellent
Confidence & Anxiety Reduction	5	0.88	Good
Behavior & Collaboration	5	0.92	Excellent

Table 1 indicates that Cronbach's alpha value of all constructs is greater than threshold. The high reliability coefficients indicate consistent measurement across cognitive, affective, and behavioral constructs, supporting the validity of subsequent inferential analyses.

4.1.2 Assumption Testing

Normality assumptions were examined using skewness and kurtosis statistics. Table 4.2 indicate the results which indicate that all values fell within ± 1 , indicating approximate normal distribution.

Table 2. Normality Statistics for Pre- and Post-Test Scores

Variable	Group	Skewness	Kurtosis
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Pre-test Scores	Experimental	-0.18	-0.41
Pre-test Scores	Control	-0.22	-0.37
Post-test Scores	Experimental	-0.31	-0.29
Post-test Scores	Control	-0.27	-0.33

4.2 Cognitive Learning Outcomes

4.2.1 Descriptive Statistics

Table 3 indicates the results of Descriptive Statistics for Pre- and Post-Test Performance. Baseline equivalence was established through comparable pre-test means between groups.

Table 3. Descriptive Statistics for Pre- and Post-Test Performance

Group	Test	N	Mean	SD
Experimental	Pre-test	35	14.28	3.12
Experimental	Post-test	35	22.63	3.45
Control	Pre-test	35	14.06	3.27
Control	Post-test	35	17.34	3.16

Both groups began at similar proficiency levels. However, post-test scores revealed a substantial performance increase in the experimental group.

4.2.2 Within-Group Learning Gains

Within-Group Learning Gains was examined by using Paired-samples t-tests and the results in table 4 demonstrated statistically significant improvements in both groups.

Table 4. Paired Samples t-Test Results

Group	Mean Gain	<i>T</i>	df	<i>P</i>	Cohen's <i>d</i>
Experimental	+8.35	18.42	34	< .001	3.11
Control	+3.28	7.10	34	< .001	1.20

Although both instructional approaches resulted in gains, the experimental group exhibited markedly larger improvement. The effect size ($d = 3.11$) indicates an exceptionally strong instructional impact of Kahoot-based learning.

4.2.3 Between-Group Comparison

Independent-samples t-test results confirmed statistically significant post-test differences favoring the experimental group.

Table 5. Independent Samples t-Test for Post-Test Scores

Comparison	<i>t</i>	Df	<i>p</i>	Cohen's <i>d</i>
Experimental vs. Control	6.78	68	< .001	1.64

The large effect size ($d = 1.64$) demonstrates strong educational significance, suggesting that Kahoot-based instruction substantially outperformed traditional teaching methods.

4.2.4 ANCOVA Results

To control for baseline differences, ANCOVA was conducted with pre-test scores as a covariate. Results are presented in table 4.6.

Table 6. ANCOVA Summary

Source	<i>F</i>	<i>p</i>	Partial η^2
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Group Effect	41.52	< .001	.38
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The group effect remained statistically significant after adjustment, $F(1, 67) = 41.52, p < .001$. The partial η^2 value of .38 indicates that 38% of the variance in post-test scores was attributable to instructional modality. This represents a large effect size and confirms that learning gains were directly associated with the Kahoot intervention rather than pre-existing differences.

4.3 Affective and Behavioral Outcomes

4.3.1 Questionnaire Results

The results reported in table 7 shows that students in the experimental group reported highly positive perceptions across all measured constructs.

Table No. 7 Descriptive Statistics of Questionnaire Scales

Construct	Mean	SD
Motivation	4.52	0.46
Engagement	4.47	0.51
Vocabulary Retention	4.58	0.44
Reading Support	4.39	0.48
Confidence	4.41	0.50
Behavior & Collaboration	4.55	0.45

Mean scores above 4.30 across all domains indicate strong agreement regarding Kahoot's positive impact. Vocabulary retention, motivation, and collaborative behavior received the highest ratings, suggesting multidimensional benefits beyond academic achievement.

5. Discussion

This research paper explored the effects of teaching English as a second language to elementary education students using Kahoot, in terms of cognitive, affective, and behavioral outcomes, through vocabulary retention, reading comprehension, motivation, engagement, confidence, and classroom participation. The results indicate that gamified teaching using a structured approach considerably improved the performance and classroom dynamics of students as compared to the conventional teaching. The size of the effect sizes, the convergent nature of the results on questionnaires, the observations in the classroom setting, and system analytics, suggests that Kahoot was not a mere supplemental motivational tool, but cognitively and pedagogically transformative.

5.1. The role of retrieval practice in vocabulary retention

A key conclusion of this research relates to the massive increases in vocabulary retention in students that were exposed to Kahoot-based instruction. Cognitively, the given outcome can be explained using the retrieval practice theory, which assumes that active recall can reinforce memory consolidation and retention in the long term (Butler and Roediger, 2024). Kahoot also has learners memorize lexical items repeatedly in a timed procedure and in this way strengthens neural routes linked to vocabulary storage.

Contrary to the conventional method of teaching vocabulary, which frequently depends on active repetition or translating, Kahoot makes vocabulary acquisition an active, repetitive process of recall and feedback. Immediate corrective responses also promote encoding where the learners can rectify mistakes promptly. It is consistent with the principles of dual coding, which implies that the association memory networks can be heightened by the multimodal presentation using the combination of text, visuals, and colour cues (Qi and Zhang, 2025). However, with the traditional classroom with a significant amount of vocabulary being memorized through simple means, students might not carry out enough retrieval loops to aid

in long-term learning. These practices augment dependence on the short memory and limit chances of any sensible consolidation. The significantly high effect sizes in the experimental group are, thus, indicative that the retrieval based gamified practice does make a substantial decrease of the superficial processing and assists in the deepening of the lexical integration. Notably, the vocabulary learning process in the Pakistani elementary setting is usually lacked in the extra-curriculum exposure. The repetitive and multimodal format of Kahoot made a good guess at the expense of such a sparse input density, probably by increasing the frequency of retrieval and strengthening semantic mapping, during classroom time.

5.2. Active processing and reading comprehension

Another most interesting result of the current study is the improvement of the reading comprehension performance of the learners, who were taught through the modality of a Kahoot. The reading comprehension is a complex process that requires the decoding of the text, its synthesis to make a variety of inferences and the synthesis of textual understanding to form coherent mental images (Zhu and Au, 2023). Kahoot platform restates comprehension tasks in terms of interactive, time limited, decision making challenges. Such a set up encourages active cognition instead of passive intake. In line with the Constructivist Learning Theory, constructive understanding is achieved when the learners constructively develop interrelations between the ideas, instead of passively taking the expository information. It seems that the gamified format provoked inferential thinking and was able to maintain attentional concentration. Instant feedback also was a highly important aspect. The online confirmation or correction encourages metacognitive surveillance and allows a learner to evaluate the extent of their knowledge and change the interpretive strategies (Mayer, 2024). Delayed feedback in conventional teaching can limit the line of responding to stimuli with the benefit of cognitive recalibration. The active feedback inherent Kahoot was likely to strengthen the monitoring of comprehension, as well as help to reduce misconceptions. On the contrary, teacher-centred reading methods often focus on literal memorisation and oral decoding. These practices can suppress superior order processing. These current results are an indication that gamified learning cannot be regarded as mechanisms of understanding that can scaffold the inferential activity and facilitate further acquisition of textual meaning, especially in the situation of elementary ESL education, which often focuses on superficial comprehension.

5.3. Gamification and motivational activation

The affective results of the current research paper show that the experimental group has a steady and higher level of motivation, engagement, and enjoyment. These outcomes can be explained in terms of the Gamification Theory which provides the conceptual framework. Kahoot includes the use of points, leaderboard, timed challenges, and instant reinforcement cycles, all which invoke reward-related motivational pathways and attentional control (Ahn et al., 2023; Li and Han, 2024). Structured loops of reinforcement that maintain attention of learners are a product of competition and immediate feedback. Emotional stimulation induced by games can enhance a set of dopamine mediation presence throughout the engagement processes, which have been linked to continuous attention and endurance (Xu and Chen, 2025). Conversely, traditional teaching environments often rely on delayed feedback and summative feedback, and these could provide insufficient motivational encouragement within the learning processes. As a result, the levels of interest are generally reduced, particularly in young learners. There was also significant decrease in language anxiety. The hypothesis of the Affective Filter put forward by Krashen states that reduced anxiety will result in that the input is processed more effectively and thus language is acquired. The answer system offered by Kahoot (responses by a device) alleviates the fear of making a mistake in front of others, which leads to the creation of the sense of emotional safety. This anxiety reduction likely had an impact on the willingness to participate and an amplified cognitive engagement in activities.

5.4. Classroom behavior and social participation

The social aspect of gamified instruction is highlighted by the behavioral changes, which were observed in the experimental cohort. There was also an increase in the voluntary participation, reduction in disruptive behavior and strengthening of peer collaboration as had been recorded consistently as observed and through analytics. The social Learning Theory is the theory that states that learners observe and imitate the behavior of their peers in a dynamic environment. The system of leaderboard in Kahoot makes the performance of peers publicly visible, which contributes to the implementation of adaptive strategies and may improve cooperation efforts. The resulting cordial rivalry seems to induce non-exclusive participation as opposed to isolation.

Conversely, the traditional classroom setting often has a lack of inequality of participation where the students with high confidence seek to take control of a discussion leaving others without control. The fact that Kahoot requires everyone to respond reduces the situation of passive disengagement hence leading to better classroom integration and concentration. Moreover, Kahoot activities go through very fast steps, which minimize wastage of time- a frequent antecedent of disorder in the classroom. The platform enhances pedagogical efficiency and classroom control through maintaining permanent interaction.

5.5. Integrated cognitive–affective dynamics

This paper clarifies an important interplay between cognitive and affective experiences: improvements in vocabulary and reading comprehension were accompanied with a higher level of motivation and confidence, which suggests that affective activation mediated these cognitive improvements. Students with increased motivation devote more mental energy to work, also have more tenacity and better attention control. The conglomeration of the scholarly and emotional enhancements validates the conceptual merging of the cognitive load regulation with motivational activation within the gamified setting (Sailer and Homner, 2023). That is why the effects of Kahoot seem to be multidimensional: it reduces cognitive and affective barriers, which occur simultaneously through retrieval scaffolding and emotional involvement, respectively. This combined process is the likely explanation of the abnormally huge effect sizes that have been reported.

5.6. Contextual implications for Pakistani ESL classrooms

The results have specific implications to the elementary ESL application in Pakistan, where pedagogies that are teacher-centred and learning curricula that are subject-to-exam are still the main ones (Tariq and Ahmad, 2024). The paper will show that digital interventions, which are interactive and low cost, can produce significant learning outcomes without compromising academic rigour. Notably, Kahoot does not have sophisticated infrastructure requirement. The fact that it is effective in a resource-rich school environment implies that it can be scaled to other similarly-resourced educational contexts, which makes the assumption about effective educational technology demanding complex or costly systems instead of challenging to adopt. Furthermore, the rate of increasing interaction and trust can make the platform help reduce the achievement gaps related to inequality in participation and anxiety.

5.7. Synthesis of the findings

Together, the findings show that instruction using Kahoot stimulated inter-associated cognitive, affective, and social processes and enhanced the acquisition of English language in elementary learners. Vocabulary consolidation occurred because of retrieval practice. Combination of both active information processing and feedback contributed to increased reading comprehension. The gamified cycles of reinforcement raised the motivation and reduced anxiety. Universalism restructured the classroom relationships. The scale of the results and their regularity suggests that Kahoot was a formalized system of teaching, and not a superficial interaction instrument. When integrated learning system synchronization between retrieval practice, feedback and

motivational activation was brought together, Kahoot provided statistically significant, pedagogically impactful improvements in a variety of areas. The findings support the idea of the systematic integration of gamified teaching systems into the elementary level of ESL teaching and serve as an empirical basis that can be used to develop the further discussion of the technological-mediated language learning system in the context of developing education.

6. Conclusions

The current study highlights the considerable role of Kahoot-based instruction methods in academic achievement and classroom experiences of elementary English as Second Language (ESL) learners. Kahoot can be thought of not only as a motivational tool, but as a complex pedagogical intervention by improving study participants' lexical memory, reading comprehension, motivation, engagement, self-confidence, and classroom behavior. Moreover, the results suggest that gamified learning milieus have the potential to promptly and synchronously arouse cognitive, affective, and social phenomena, which play a critical role in the effective acquisition of language. The consequences of these findings have many implications to the practice of instructions as well as educational policy, and they consider the methodological constraints that should be interpreted with caution. In addition, the paper provides relevant opportunities to further research in the sphere of technology-based learning of languages.

The results prove the pedagogical importance of using the structured gamified platforms in the English classes of elementary schools. Vocabulary teaching with the use of Kahoot supported vocabulary learning based on repeating the retrieval procedure and multimodal reinforcement of the latter, hence suggesting that active recollection and live feedback should be aimed at becoming the fundamental components of vocabulary instruction. Therefore, it is recommended that educators place greater emphasis and use retrieval-based activities, as well as formative digital assessments, than passively memorize.

Enhanced reading comprehension also implies that inferential reasoning and metacognitive awareness may be scaffolded by interactive time-sensitive questioning. By incorporating gamified comprehension activities in lesson planning, it might be possible to undergo a pedagogical transition between the superficial decoding on the surface and creating a deeper meaning. Implications of affective findings are also as salient. A high level of motivation, low level of anxiety and an increase in confidence that is provided to them, are indicative of the fact that learning supportive environments that are emotionally established are vital and not a supplement to the acquisition of language. The ability to reduce the affective filter that is possessed by Kahoot implies that gamification tools can be utilized as an inclusive participation mechanism when it comes to learners who tend to hesitate or demonstrate lower confidence in the traditional teacher-centred setting.

In institutional and policy-levels, the research shows that effective digital innovation does not necessarily require costly technological infrastructure. The performance of Kahoot in a situation with moderate resources implies that it can be scaled on the system of education that is developing. Therefore, policymakers may think of considering incorporating cheap gamified platforms into the national literacy programs, teacher training models, and formative assessments systems. Moreover, the results support the idea of reforming curriculums in the context of which technology-enhanced retrieval practice and interactive assessment are implemented in the official syllabuses and not moved to the peripheral enrichment activities. In line with the curriculum standards, integrating gamified learning could facilitate the adoption of this model in the various learning institutions.

6.1 Limitations

There are a few limitations to be considered. First, the study was conducted using quasi-experimental design using intact groups instead of randomization. Even though statistical

methods of attenuating the discrepancy at baseline were incorporated like ANCOVA, other unmeasurable variables could still have contributed to results. Secondly, only 70 female students of one semi-urban Army Public School were used as a sample. Although such homogeneity reinforced internal consistency, it limits the applicability of the findings. Therefore, the findings might not be quite accurate and reflective of male learners, mixed-gender classes, rural schools, and public sector teaching institutions with variable resource bases. Thirdly, the intervention was six weeks long. The study fails to give evidence on long-term retention or long-lasting motivational influence though they are enough to show gains in the short run. The lasting ability of changes after the intervention period is uncertain. Fourthly, the research was more concerned with retention and reading comprehension in vocabulary. It was not tested on other areas of language: speaking, listening, pronunciation, grammar and writing. Subsequently, inferences are to be drawn within the framework of the quantified abilities. Lastly, despite the high reliability of the questionnaire used and the use of triangulation, social desirability bias could lead to bias in the self-report measures. Further qualitative information, e.g. interviews or reflective journals, could have provided a deeper knowledge on the experiences and instructional dynamics of the learners.

6.2 Future research directions

The findings can be furthered in future research in several directions. Longitudinal studies need to determine whether vocabulary and comprehension increases are long-lasting and whether motivational impacts are sustained following the decadence of the novelty of gamification. Long-term retention and transfer of learning outcome information would be a welcome compartment to delayed post-tests and semester-based intervention protocols. Further research investigations are to observe the impact that Kahoot has on a wider range of linguistic skills, such as oral fluency, listening comprehension, phonetic improvement, grammatical competence, and written competence. The detailed analysis of these areas would help to understand the instructional potential of the platform more clearly.

Replication studies, carried out in different types of societies, such as in public schools, rural schools, classrooms with mixed-gender, and in populations with different socioeconomic levels, are essential in increasing the generalization of findings made. Cognitive engagement in younger learners may also be best explained by comparative analyses of the specific gamified platforms (e.g., Quizizz, Blooket, Wordwall) and which design features are the most effective in eliminating cognitive overload. Using mixed-methods studies that combine interviews, classroom discourse analysis, and educator reflections might provide more insights into the experiences of learners, the fidelity of instruction and issues of contextual implementation. Besides, further researchers can explore variables associated with teachers, including digital literacy, instruction design competence, and concept towards gamification in effort to understand implementation variability more effectively.

Research on culturally responsive variations of gamified instruction would expand the knowledge base on the mechanisms of competition, collaboration, and play in various learning settings. Altogether, the current research shows that instruction based on Kahoot can have a significant positive impact on elementary ESL learning provided that it is supported by sound pedagogical principles. Gamified learning settings can potentially be quite effective in supporting basic English literacy results by incorporating retrieval practice, instant feedback, and motivational design into a coherent instructional system. Ongoing research will narrow implementation methods, build on theoretical understanding, and endorse evidence based educational innovation.

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