The Effectiveness of CALL To Enhance English Comprehension for Pakistani ESL Learners

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Abstract

This research proposes to assess the usage of CALL tools to promote English language skills and vocabulary learning for university-level ESL learners in Pakistan. Because of the increasing role of technology in education, the research aimed to identify how CALL tools could help to overcome some or all of L2 learning obstacles. Surveys with 500 students were conducted at 10 universities with control and experimental groups of students and 100 teachers participated in these surveys. Quantitative interviews were conducted to evaluate language skills and perceptions of educators using pre and post-tests. The results of this study showed that with higher scores in the post-test the students of experimental group who used CALL tools like Duolingo and Quizlet enhanced comprehension and remembers the meaning of specific vocabulary than those in the control group. Factors like real-time feedback, interactivity and contextual relevance help to promote CALL tools' effectiveness. However, technological infrastructure and costs were found problematic issues. This research establishes a positive correlation between using CALL tools and English language learning when combined with conventional learning methods. The paper suggests buying technological resources, training teachers to integrate CALL in the classroom, and producing a culturally relevant context to make full use of the tools.

Keywords: computer-aided language learning, ESL, ESL vocabulary, foreign language acquisition, instructional technology, Pakistani university-level learners, familiarity with English.

Introduction

Two of the most prominent difficulties to be faced by most ESL learners in Pakistan, particularly university students, are English comprehension and vocabulary retention. Mostly university academic courses depend on English as the medium of instruction; students must be highly proficient in English. Nevertheless, previous approaches toward language teaching and learning are ineffective in addressing the learning needs of students (Irshad & Ghani, 2011). Following the traditional model of teaching and learning in the past few decades, **Computer-Aided Language Learning (CALL)** has emerged as an important alternative and complementary teaching-learning mode that is encouraging and customized. CALL tools – which integrate multimedia and adaptive learning principles – allow learners to practice the English language in a learner-centered environment. (Ashraf, 2016).

Thus, it is possible to state that CALL has the potential to respond the requirements and face the multifaceted learning context of Pakistani ESL learners by supporting personalized learning paths and immediate feedback. For example, the multimedia component of CALL tools, including audio-visual and animated elements and exercises through voice and picture, has been validated to improve comprehension due to learners' multi-sensory learning (Wang et al., 2024). Furthermore, CALL tools where vocabulary reinforcement is provided via spaced repetition and context-based practice following the learning and which space-cued repetition the retention research indicates may be helpful for long-term retention (Nazeer et al., 2023). These benefits make CALL especially useful in a Pakistani environment where, as mentioned before, quality educational services are scarce, and students, in most cases, cannot practice English surrounded by native speakers.

Alas, despite such potential, CALL environments in Pakistan are not well developed, and its potential for ESL learners, particularly university ones, has remained rather understudied. This study aims to evaluate CALL tools in enhancing English comprehension and vocabulary mastery among Pakistani tertiary-level ESL learners and explore the unique features of CALL tools that contribute to these improvements (Kartini et al., 2024). In providing these details of the roles of CALL in enhancing

the comprehension skills of these learners, this research proposes to fill this gap in the current literature, highlighting how technological solutions are complement face-to-face instruction. Also, it is helpful to know what aspects of CALL software enable the improvement of language acquisition so that future CALL applications are designed or modified according to the Pakistani context—and, if possible, with higher effectiveness than the programs that have already been tested (Chen, 2024). This research attempts to fill the existing literature by investigating the role of CALL within Pakistan's context in the development of ESL education. The findings of this study may have implications for the policy and deregulation of English language teaching and learning, as well as for the general acculturation of technology use in language acquisition. The scholarship advanced in this paper aims to offer practical suggestions as to how CALL improves English understanding and vocabulary acquisition to those who teach and learn university-level ESL in Pakistan and a lensed examination of CALL in this regard.

Statement of Problem
The English language plays an important role in Pakistani student's achievement; however, ESL learners in universities face problems related to understanding and retrieval of vocabulary because traditional methods of instruction at times present low interaction with the students. Nonetheless, with the incorporation of technology in the worldwide education industry, today Pakistani universities have marked some hindrances in using the CALL tools, such as; lack of technological facilities, a dearth of professional development of trainers, and lack of culturally sensitive material. This study aims to fill these gaps by assessing the utility of CALL tools and applications in enhancing the comprehension of English and training the vocabulary of Pakistani university learners who learn English as a second language, revealing factors that facilitate language acquisition gaps that hinder CALL use, and advancing potential solutions for their resolution.

Research Objectives
Here are the research objectives of this study are elaborated as:
- To evaluate the efficacy of computer assisted language learning (CALL) technologies in augmenting English linguistic proficiency among tertiary level Pakistani ESL students.
- To analyze the influence and impact of CALL tools on vocabulary retention and comprehension among university-level Pakistani ESL learners.
- To delineate key factors within CALL software that contribute to enhanced language acquisition and vocabulary retention for university-level Pakistani ESL learners.

Research Questions
1) What measurable improvements in English linguistic competence can tertiary level Pakistani ESL learners achieve through CALL technologies?
2) How do CALL tools affect the retention domain specific vocabulary and cognitive integration of linguistics structures among Pakistani university ESL students?

Significance of the Study
This study is an important contribution to addressing the emergent demand for novel strategies for language acquisition in Pakistan. As it assesses the impact of CALL, it helps enrich the approaches to teaching English as a Second Language to university learners. The results offer actual practice evidence on the impact of technology on understanding and lexical acquisition, information that guides educators and policymakers trying to optimize language learning. Furthermore, important factors have been pinpointed that impact the effectiveness of CALL tools, such as the cultural appropriateness and availability of the tools, thus creating a pathway for more particularized language tools. These contributions are important for narrowing the gap between conventional and innovative learning frameworks, thereby preparing learners for the modern world by endowing them with appropriate linguistic essays meant for success in their academic and career life in the emergent globalization world.

Delimitations
It is important to note that the following study was confined to Pakistan only and, more particularly, to university learners of English as a second language who are learning English with the help of Computer-Aided Language Learning [CALL]. The study was conducted in only ten universities, with only 500 students and 100 teachers participating. The data collection tools used included structured pre-tests, post-tests, and surveys. This limited CALL tools to only such tools that are popular globally; we included only tools like Duolingo, Quizlet, etc; the teaching phase was for three months. A few important components of language skills, such as pronunciation, were not discussed in detail, and consideration of non-ESL learners or organizations at levels other than universities was made to confine the study conveniently so that it could be manageable and not too broad.

Literature Review
With the advancements in computer technology, CALL has emerged as a new face of learning a language that improves ESL learners' understanding and vocabulary. This discussion of early CALL research illustrates its ability to offer rich interactive multimodal contexts that meet multiple modes of learning, which are important in language learning (Blake, 2013). Thus, the theories motivating this study, including Krashen's Input Hypothesis and Swain's Output Hypothesis, were prescriptive of comprehensible input and opportunities for language learning, respectively (Naz et al., 2022). CALL tools provide learners with context-embedded language learning activities, which could be more effective than conventional methods. For example,

graphics, including images, sound, and movies in the CALL suite have proven to assist comprehension in that they supplement thieves that make abstract and new/revised vocabulary more comprehensible (Shadiev & Yu, 2024).

CALL has also received commendable results in vocabulary acquisition and retrieval, whereby spaced repetition and contextual practice have benefited the CALL as a learning feature that repeats vocabulary over time (Wu & Li, 2024). Studies show that when adaptive learning of new terms is done through digital platforms, it provides the learners with revisits of the terms at the right time, thus helping them retain them long-term (Abbasi et al., 2024). Also, to enhance interaction, CALL tools with feedback functions help learners by helping them to get feedback on the errors they have made within learner training activities, which has been beneficial in engraining comprehension (Gurmani, 2023). This immediate correction is a good feature because Pakistani ESL learners often do not have an opportunity to practice language in real-life situations outside the classroom.

Research that followed shows that CALL environments also promote learner motivation and participation, which are critical in the learning of language. Some of the motivation theories, for instance, Gardner's socio-educational model, suggest that affective variables, the attitudes and motivation of learners, influence their achievement in the second language (Talpur et al., 2021). For example, CALL has interaction, task, feedback, and assessment places. These have been identified to break the monotony and increase fun, thus motivating the learners, especially the Pakistani ESL learners who may take time to develop an interest in repetitive simple language exercises (Meihami & Alexander, 2024). Moreover, due to the flexibility of CALL, it helps the learners to learn at their own pace, and unlike traditional classrooms, CALL helps each learner to progress at his own rate, which has positive implications for the learning process (Nazeer et al., 2024).

Despite the proliferation of research on CALL, relatively little research has been conducted on its use in certain linguistic and cultural areas such as Pakistan. Nonetheless, research among other ESL settings indicates that CALL enhances students' language needs with restricted usage of English (Abbasi et al., 2021). The present study by Gardner (2014) revealed enhanced achievement in reading and vocabulary by Pakistani ESL students using the CALL tools in contrast to a traditional teaching method. The benefits were the greatest when learners were exposed to assets that gave meaning, allowed for reconnoiter of selected terms, and included multimedia parts, all of which decreased cognitive overburden and advanced composite feel (Nazeer et al., 2023). Likewise, Namaziandost and Rezai (2024) revealed that CALL applications enhance vocabulary knowledge and students' self-confidence in the use of the language, which is one area that defines language proficiency.

That notwithstanding, several barriers exist to adopting and effectively using CALL in Pakistan. Several technological factors, including restrictions involving access to technology, including computers and the internet, and implementation of these technologies, have remained a challenge, mainly in rural and other hard-to-reach regions (Khatoon et al., 2022). Furthermore, most of the CALL programs are developed for Western students, so the factor of culture and language may have an impact while implementing these CALL programs in Pakistani classrooms. According to many authors, CALL material must be culturally appropriate in terms of content and language used to have an optimal positive effect on Pakistani learners (Chapelle & Jamieson, 2008).

Based on this literature review, there is a significant need to fill the gap in research on how CALL enhance Pakistani ESL learners' understanding and vocabulary comprehension. The findings of research in other ESL settings indicate the possibilities of quality enhancement through CALL, which is why researchers stress the importance of adapting technologies and approaches to the Pakistani context, paying attention to students' linguistic and cultural differences. Thus, this study's goal is to extend the prior scientific findings on CALL and assess whether or not it is effective in the Pakistani ESL environment and what recommendations for curricular and policy improvements relating to language learning in Pakistan could be made based on the findings.

Methodology

This was an exploratory and inferential study in that qualitative and quantitative data were analyzed. The researchers targeted 500 students and 100 teachers from 10 universities in Pakistan, 50 students and 10 teachers from each university. The students were sampled purposively because of the nature of the study, though the population is the university level students. The researchers needed those students who attempted or used CALL to improve or learn English as a second language. Nonetheless, the teachers were selected using the nth/systematic sampling technique. The students were grouped and named control and experimental groups, respectively. The experimental group was taught for three months using ten CALL apps: Duolingo, Quizlet, Rosetta Stone, Anki, Babbel, LingQ, Busuu, Memrise, EnglishCentral, and APEuni. Teaching the experimental group also involved quizzes, flashcards, games, remembering vocabulary, videos, real-life examples, an Adaptive learning method, and a feedback mechanism after learning. Throughout the research, students and teachers were administered pre-tests, post-tests, and surveys to collect data from the participants' students and teachers. Potential differences revealed before and after CALL software and tools exposure. In order to determine the effectiveness of CALL, the researchers constructed English vocabulary retention and comprehension-based questionnaires. Teacher surveys reveal the efficiency of the CALL apps/ software /tools. These software tools were reviewed to identify the factors that enhance CALL software and tools for vocabulary development among university-level Pakistani ESL learners. Popular theories, namely the Technology Acceptance Model (TAM) proposed by Davis (1985), were employed to investigate learners' perceived attitudes and the interactive features of CALL in language learning. Perceived Usefulness, Perceived Ease of Use, Attitude Toward Use, Behavioral Intention to Use and Actual System Use were used to further analysis the data according to TAM.

Data Analysis and Results

According to the mixed-methods research methodology, the analysis starts with the assessment of the pre-test to determine the participants' English proficiency level. A pre-test was given to five hundred students involved in the study, dividing them into a control and experimental group and lecturing at ten universities in Pakistan. This test covered all four skills of the language: Listening, speaking, reading, and writing, and was intended to determine the pre-CALL tools proficiency level of the

experimental group. The first set of scores, based on the ranges of the pre-test test results, offers a baseline comparison between the groups' performance on which further CALL intervention analysis may build on the differences represented in the subsequent post-test scores. The results of pre and post-tests are given below:

Pre-Test Results

In this study, a question paper was designed to assess all four language skills including listening, speaking, reading, and writing of 500 participant students. The tests, conducted in groups of 50, were administered with the assistance of teacher colleagues, particularly for the listening and speaking sections. The results of these tests were then compared with the performance of the experimental group using the Duolingo app. Pre-test results are summarized in Table 1 below:

Table 1 *Pre-Test Results of Control and Experimental Groups*

Sr. No.	Range of Marks	Number of Students of Control Group	Number of Students of Experimental Group
1	1-10	11	7
2	11-20	21	23
3	21-30	56	59
4	31-40	86	91
5	41-50	42	35
6	51-60	25	31
7	61-70	9	4

Table 1 displays the pre-test results for both control and experimental groups, where the test was scored out of 100, with 25 marks allocated for each skill. To facilitate analysis, the total scores were categorized into ranges of 10 marks each (e.g., 1–10, 11–20). The second column of the table presents these ranges, while the third and fourth columns indicate the number of students in each group who scored within these ranges. For example, 11 students in the control group and 7 students in the experimental group scored between 1 and 10 marks. Similarly, 21 students in the control group and 23 students in the experimental group scored between 11 and 20 marks, and so forth. The table provides a clear comparative overview of the pre-test performance, highlighting the distribution of scores across both groups.

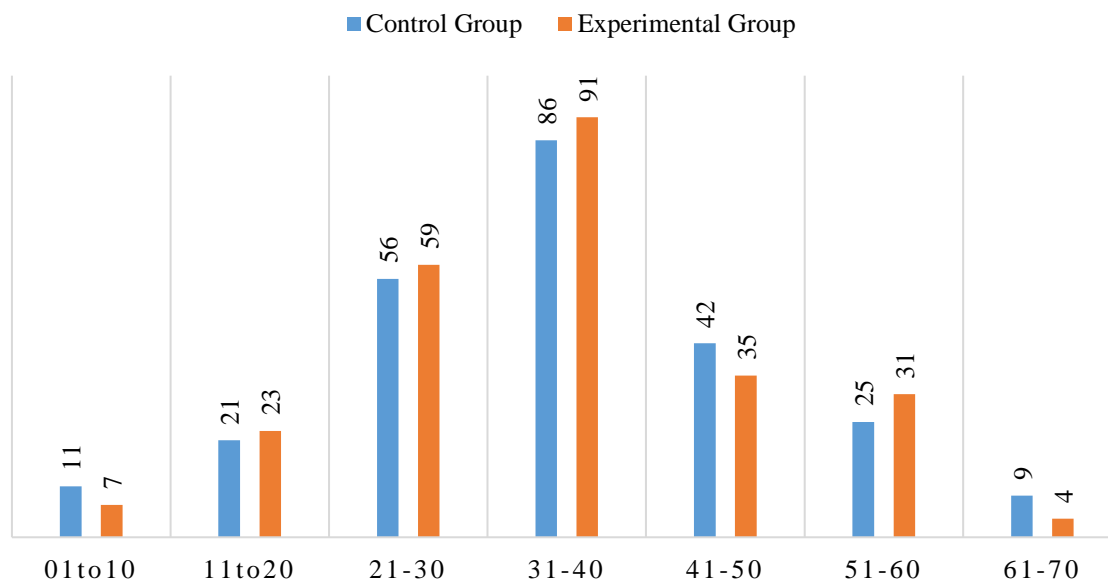**Pre-Test Results of Control and Experimental Groups**

Chart 1: *Pre-Test Results of Control and Experimental Groups*

Chart 1 visually represents the pre-test performance of both the control and experimental groups. The horizontal axis depicts the range of marks (e.g., 1–10, 11–20, etc.), while the vertical axis shows the number of students within each range. For instance, 11 students from the control group and 7 from the experimental group scored between 1 and 10 marks. Similarly, 21 control group students and 23 experimental group students scored in the 11–20 range. The trend continues across all score ranges, with the highest scores observed in the 61–70 range, where 9 control group students and 4 experimental group students achieved these marks. The chart uses blue bars to represent the control group and orange bars for the experimental group, providing a clear comparative visualization of the pre-test score distribution.

Teaching Phase

The teaching phase for the experimental group spanned three months and involved 250 students, divided into five sub-groups of 50 students each. This phase was meticulously planned and implemented with the assistance of teacher colleagues, who worked alongside the researchers to deliver instruction using a variety of CALL tools. A structured teaching program was developed, incorporating the use of 10 AI-powered applications: Duolingo, Quizlet, Rosetta Stone, Anki, Babbel, LingQ, Busuu, Memrise, EnglishCentral, and APEuni.

Instruction was conducted over three cycles, each lasting four weeks, with five teaching days per week. During the first cycle, students were introduced to the CALL tools and taught foundational skills using interactive methods such as quizzes, flashcards, games, videos, and real-life examples. These activities aimed to enhance vocabulary retention and comprehension while fostering engagement through adaptive learning techniques and real-time feedback mechanisms. At the end of the first cycle, a test was conducted to assess the students' progress and identify their weak areas.

In the second cycle, the teaching focus was refined based on the test results. Additional targeted practice was provided to address specific challenges faced by students. Teachers utilized personalized learning plans to strengthen the students' weaker skills, incorporating interactive exercises and tailored feedback. Another test was administered at the end of this cycle to evaluate improvements and further guide instruction.

The third and final cycle reinforced the cumulative learning from the previous sessions, with an emphasis on solidifying comprehension and vocabulary retention. Teachers encouraged collaborative activities and engaged students in more complex exercises to prepare them for the post-test. At the conclusion of the third cycle, a comprehensive post-test was conducted to measure the effectiveness of the CALL tools and teaching methodology. This systematic approach ensured consistent monitoring and support for the experimental group's language acquisition journey.

Post-Test Results

After the completion of the three-month teaching phase, a post-test was conducted to evaluate the impact of the CALL tools on the language proficiency of the experimental group. This test was identical in format to the pre-test, assessing all four language skills: listening, speaking, reading, and writing. Both the control and experimental groups, consisting of 250 students each, participated in the post-test. The tests were administered in groups of 50, with the assistance of teacher colleagues to ensure consistency and fairness, especially in the listening and speaking components. The post-test results provided a comparative analysis of the two groups, highlighting the changes in their performance following the intervention. The results of post-test are given below in table 2:

Table 2 Post-*Test Results of Control and Experimental Groups*

Sr. No.	Range of Marks	Number of Students of Control Group	Number of Students of Experimental Group
1	1-10	7	3
2	11-20	24	12
3	21-30	51	32
4	31-40	92	49
5	41-50	38	46
6	51-60	30	38
7	61-70	8	29
8	71-80	0	27
9	81-90	0	12
10	91-100	0	2

Table 2 presents the post-test results of the control and experimental groups, with scores categorized into ranges of 10 marks each. The number of students achieving scores in each range is listed for both groups. The table reveals a significant improvement in the performance of the experimental group compared to the control group. For instance, in the lowest range (1–10 marks), only 3 students from the experimental group scored within this category, compared to 7 from the control group. In the highest range (91–100 marks), 2 students from the experimental group achieved this distinction, while none from the control group reached this level. Similarly, 27 students in the experimental group scored between 71–80 marks, a range that saw no representation from the control group. Overall, the distribution of scores indicates a notable shift toward higher ranges for the experimental group, underscoring the effectiveness of the CALL tools and teaching methodology.

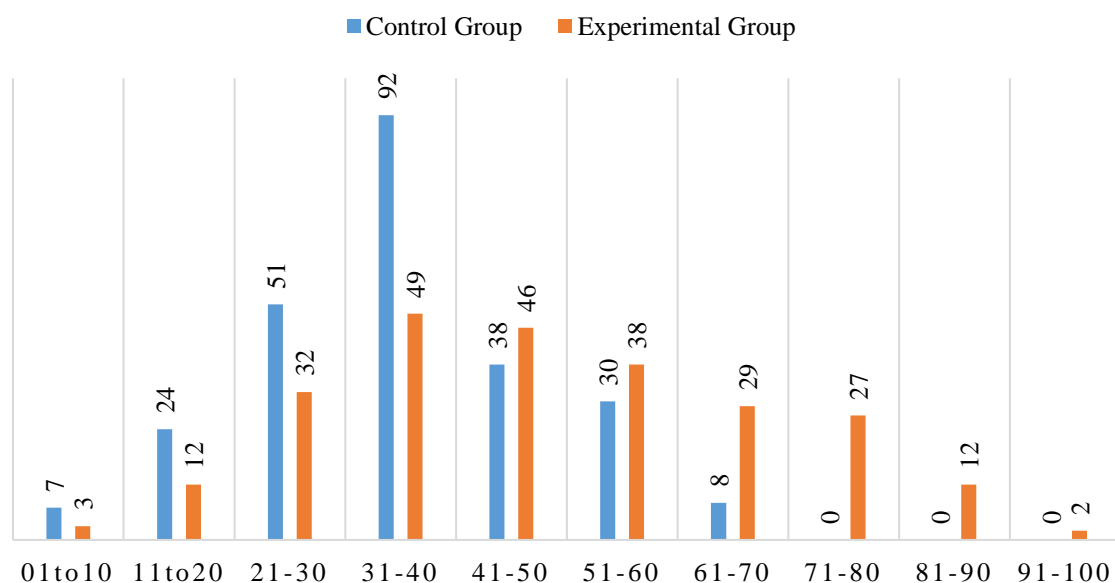## Post-Test Results of Control and Experimental Groups

Chart 2: *Post-Test Results of Control and Experimental Groups*

Chart 2 visually illustrates the post-test results of both groups, with the horizontal axis representing the range of marks (e.g., 1–10, 11–20) and the vertical axis showing the number of students in each range. Blue bars represent the control group, while orange bars indicate the experimental group.

The chart highlights the marked improvement in the experimental group's performance. For example, in the higher ranges (61–70, 71–80, 81–90, and 91–100 marks), the experimental group consistently outperformed the control group. The control group's scores predominantly cluster within the lower to mid-range categories, such as 31–40 and 41–50 marks, while the experimental group's scores demonstrate a broader distribution, with a significant number of students achieving scores in the upper ranges.

This visual comparison effectively demonstrates the impact of the CALL tools and the structured teaching methodology employed during the experimental phase. The shift in score distribution toward higher ranges in the experimental group reflects enhanced comprehension, vocabulary retention, and overall language proficiency.

Survey Results

To gain insights into the perceptions and experiences of educators regarding CALL tools, a survey was conducted among 100 teachers from 10 different universities in Pakistan. These teachers were systematically selected using the nth sampling method to ensure a representative sample. The survey focused on evaluating the effectiveness, usability, and challenges of CALL tools in facilitating English language learning at the university level.

The survey comprised 20 descriptive statements, each rated on a 5-point Likert scale, where 1 indicated strong disagreement and 5 indicated strong agreement. The questions were designed to assess various aspects of CALL tools, such as their impact on language skills, user-friendliness, alignment with modern teaching methodologies, and barriers to their implementation. Responses were collected over a two-week period, either in person or via email, ensuring a high response rate and reliable data.

Table 3 *Results of Survey Conducted with the Teachers*

Sr. No.	Descriptive Statements	Mean	Sta. Dev.
16	I believe that a blended approach, combining CALL and traditional methods, is more effective.	4	3.46
15	CALL tools require technological infrastructure that is not always readily available in universities.	3.91	3.39
17	Students using CALL tools are more confident in their English-speaking abilities.	3.87	3.35
11	CALL tools help students understand and use English grammar more effectively.	3.78	3.28
7	CALL tools make English language learning more enjoyable for students.	3.78	3.27
20	The use of CALL tools aligns with the objectives of modern language teaching methodologies.	3.74	3.24
13	CALL apps such as Duolingo and Quizlet are user-friendly for university-level learners.	3.74	3.23

10	I have observed an improvement in students' reading comprehension after using CALL tools.	3.69	3.19
8	The use of CALL tools has significantly improved students' listening skills.	3.61	3.12
5	CALL tools motivate students to actively engage in learning English.	3.59	3.09
18	The cost of premium versions of some CALL apps limits their accessibility for students.	3.53	3.03
12	Students who use CALL tools regularly perform better in assessments.	3.46	2.98
9	CALL tools provide ample opportunities for students to practice English vocabulary in context.	3.43	2.97
19	Teachers should receive training to integrate CALL tools effectively into their teaching practices.	3.39	2.93
6	Adaptive learning features in CALL apps meet the diverse needs of ESL learners.	3.24	2.82
1	I find CALL tools effective for improving students' English comprehension.	3.27	2.78
14	Cultural and contextual relevance of CALL content enhances its effectiveness for Pakistani ESL learners.	3.25	2.76
2	CALL tools help students retain vocabulary more effectively than traditional methods.	3.1	2.65
4	Immediate feedback provided by CALL tools supports better language acquisition.	3.06	2.65
3	The use of multimedia features in CALL tools enhances students' language learning experience.	2.59	2.27

Table 3 summarizes the survey results, presenting the mean scores and standard deviations for each descriptive statement. The mean scores reflect the average level of agreement among the participating teachers, while the standard deviations indicate the variability in responses.

The highest scored statement with the mean score of 4 stands for the strong perception of teachers regarding the fact that the incorporation of CALL tools along with the conventional teaching methods are more effective. Statements regarding the need for technological infrastructure (mean: 3). The respondents showed high ratings towards the use of CALL tools on the extent of improvement in their ability in English writing and oral presentation of work (mean: 3.91) and the increased confidence of students in English speaking abilities due to CALL tools (mean: 3.87).

Statements addressing the user-friendliness of CALL apps like Duolingo and Quizlet (mean: 3). The perceived usability and usefulness of these tools, as reported by the teachers, have been rated highly including the extent to which they found these tools helpful in refining their knowledge about growth on various aspects (mean: 74), enhancing their understanding of grammar (mean: 3.78) and adoptive in conformity with the current teaching pedagogy practices (mean: 3.74).

Nevertheless, some statements were assigned less favourable scores. For instance, the use of multimedia features received (mean: 2) on a 5 – point scale. Among all these factors, the perceived helpfulness of feedback from CALL tools was lower (mean: 3.06) and the perceived helpfulness of feedback provided within 59 minutes was even lower. Variation in response causes variation in standard deviations, showcasing that there are different uses and requirements of these tools by different teachers, likely due to different teaching contexts.

As with all technology-based interventions, these findings offer important implications for understanding the affordances and limitations of CALL and underscore the need to address issues such as technological support and cost feasibility in order to realize the full potential of these resources.

Findings

Comparing the experiment results to the control group, the author establishes that the group using CALL tools showed a pronounced improvement in English comprehension. This improvement was most apparent in the post-test below, where a shift to scoring in the higher band level was seen among the experimental group. For example, 27 students in the experimental group scored between 71–80 marks, and two got between 91–100 marks, whereas none of the students in the control group secured these high scores. This trend proves that CALL tools like Duolingo and Quizlet encourage learner involvement and offer individual learning, possibly enhancing their comprehensibility. Additionally, these tools' adaptiveness and feedback functionality enabled regular comprehension enhancement of language constructs in reading and listening comprehension.

Concerning vocabulary recall, the qualitative utilization of structured interactive CALL applications is highly effective in helping students recall and use desired vocabulary in appropriate contexts. Teaching methods used over the three months of intervention, including quizzes, flashcards, and games, kept the students actively involved and repeating words and vocabulary, which are very important. This gap in desired for-better vocabulary acquisition knowledge gained by the experimental group, as shown by the marked difference between the pre- and post-test scores, are better understood if CALL tools deliver contextualized material engagingly. Such facts demonstrate the necessity of using CALL to enhance the opportunities of the most typical and traditional approaches to enhancing comprehension and growing vocabulary.

The reason why the experimental group attained higher language proficiency than the control group lies in the following: First, the application of CALL tools created an impact of commercial that minimized interactivity, as contrasted with various other

techniques. Components included in the approach, like adaptive learning, exercises within games, and multimedia, help to maintain student's interest and, at the same time, take into account the learning peculiarities of each learner. The flexibility to achieve learning goals at a self-directed pace was another advantage, especially for learners who experience difficulties with lower-order skills. Second, using real-life models and contextualized learning in CALL tools, which applies the concepts explained in the COV/IV stage, closed the gap of applicability of the given language, making the language acquisition accurate and productive.

However, equal importance must be accorded to the feedback process and, more importantly, the specifics of the interventions provided within teaching cycles. The Eli researchers' use of diagnostics coupled with instruction meant that the students were getting the necessary targeted help to address their difficulties in each case. The organization of the collaborative activities and the second and third build-ups of the skills, in particular, added more strength to the learning outcomes. At the same time, the study identified several challenges, including the technology support and costs that need to be overcome to enhance further the practical applicability of CALL tools across diverse learning environments. These factors mark how effectively implementing technological solutions forms a profound shift in language acquisition models.

Discussion

Overall, the results of this study establish the possibility of CALL for improving English comprehension and definitively increasing the English vocabulary of university-level ESL learners in Pakistan. The increase in the post-test marks of the experimental group shows how CALL tools have helped to fill voids that may exist in conventional language instructions. For example, in the assessment of the experimental group, the increase of scores in higher bands such as 71-80, 81-90, and 91-100 show the effectiveness of these tools for improving linguistic skills. This enhancement is seen in listening and reading skills, where numerous interactive and adaptive components allowed the students to understand the operational features of the language. These findings align with a rising body of work that underscores the potential of technology in enhanced sense-making and impactful learning in second language learning.

The survey results supplement the test outcomes because they give the researchers information about the CALL tools from educators' perspectives. Most of them appreciated the use of CALL in complementing the conventional teaching approaches, as supported by the high mean responses towards the effectiveness of the tools and compatibility with the current educational teaching practices. Nevertheless, some of the deterring factors identified, including the lack of proper technology facilities and the expensive options of some CALL application features. These findings support prior research on the digital divide in educational settings, especially in the developing world. The above observations show that despite the opportunities of using CALL tools in lean TESOL programs being almost limitless, the said tools' use faces several challenges, which range from access issues to teacher training.

Moreover, the present study suggests that specific and regular feedback plays a crucial role in enhancing the application of CALL tools. The highly structured and systematic approach of teaching covering diagnostics followed by specific teaching interventions helped identify areas that trouble individuals and helped build a firm foundation. The results also reflect the stimulating motivation of the game and interactive elements integrated into the CALL applications, motivating students to learn more independently. However, the aspects that are further developed – like the combination of multimedia components into the learning environment or the opportunities to receive fast feedback of superior quality – have to be discussed to enhance the usability of the CALL tools.

The conclusion reached in this study corroborates the possibility of CALL tools as an effective supplement to conventional language teaching techniques. If the above needs are met and the challenges associated with using these tools are well addressed, the helpers help to make language learning more inclusive and effective. This research could provide practical information to learning policymakers, educators, and researchers who are interested in improving language acquisition in similar education settings.

Conclusion

The study further pointed out that CALL enhances the understanding of English among university–level Pakistani ESL learners. The results are listed below: The mean post-test scores showed significant improvement within the experimental group in all comprehension areas of listening and reading skills compared to the control group. The opportunities to use the elements of interaction in combination with immediate feedback given by CALL tools meant for learning helped to enhance students' interest and understanding of the subtleties of the received linguistic patterns. These results encourage using CALL tools as a supplementary tool for teaching that enhances comprehension outcomes over and above traditional methodologies. The analysis drew considerable attention to the increasing influence of CALL tools on vocabulary gains and understanding. The experimental group was superior to the control group in all post-tested vocabularies connected with applying the words into context. The CALL application components, namely, flashcards, adaptive quizzes, and incorporating spaced repetition algorithms, were instrumental in assisting learners in storing vocabulary with retention as a significant component. Furthermore, real-life examples and multimedia experiences made within the tools supplemented the contextual view of learners and thus produced long-term retention of the language and its vocabulary.

It pointed out several factorsound within CALL tools that play a crucial role in improving the language skills of the target learners from Pakistan. Such components include the graphical user interface, intelligent learning technologies, and game aspects, which fostered user participation and custom course content. In the current study, teachers who have adopted CALL apps in teaching aspired to achieve cultural appropriateness, real-time feedback, and integration of mobile learning tools in face-to-face teaching. However, it was learned that there are existing hurdles like technological infrastructure, the cost of subscription, and expandability that need to be fixed to popularize the usage and provide a level playing field for all. Such

factors highlight the need to promote an environment that enhance the effective use of these CALL tools if implemented in language education.

Recommendations

Therefore, this paper recommends that universities in Pakistan incorporate CALL tools into English language classrooms to supplement conventional methods to promote the English language competency of ESL learners. Credited institutions should ensure the establishment of technological support, including the availability of devices and reliability of internet connection, for the efficient use of CALL. Regarding using these tools in instruction, the teachers should be trained to incorporate their interactive aspects and use them to support adaptive learning. In addition, governments need to support designers to develop accessible and culturally appropriate CALL software for Pakistani ESL learners on the one hand and learners on the other by eliminating the gaps in the enrollment, completion, and achievement of all learners.

Future Implications

The study's aims for future relevance to educational practitioners, policymakers, and software designers interested in enhancing the teaching quality of languages. For educators, it opens a new idea of using technology as an enabler of engagement and personalized learning for ESL learners. By using the said information strategies, policymakers can develop appropriate interventions, including funding programs and capacity building, to increase the use of CALL tools in universities. Furthermore, challenges and possibilities for improving CALL applications are identified so that software developers can improve the proposed tools according to Pakistani dialect, culture and language. Most significantly, this study is an endeavour to provide basis for an innovative and highly relevant outlook on modern language education in the 21st century.

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