

SYNCHRONISING ONLINE RESOURCE (PENZU) AND COMPUTER APPLICATION FOR LANGUAGE INSTRUCTIONS: A PAKISTANI POST COVID-19 PANDEMIC CONTEXT

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Abstract; *Pakistan is going through a period of transition after Covid-19 pandemic situation which created a dire need to use computer as a tool and other online resources in the classrooms. To contribute to this situation, the present study investigated the effects of using computer as a tool and Penzu software as online source for language instructions. The study used experimental design and conducted a classroom experiment of 40 higher secondary school students (20 experimental & 20 in control group) through pre/post-tests over different period of time to examine development in students' writing skills. On post-test-I, it was observed that students in the control group showed sudden rise in the development of writing skills compared to experimental group. But, on post-test-II and III, students in the experimental group showed consistency in the development in writing skills while control group could not maintain their consistency of development in writings. Hence, findings of the study revealed that using computer as a tool for instructions and Penzu as online resource to conduct writing activities proved more useful in improving students' writing skills compared to the students in the control group. Finally, findings also revealed that students became more independent in self-corrections in the experimental group and continued to expand their learning outside the classroom while control group was dependent on teacher and could only find time in the classroom for corrective feedback which limited students' learning to their classroom. In addition to this, the study recommends that further computer applications and other online resources can be more useful in language instructions apart from teaching writing skills. Besides, findings of this study have significant theoretical and practical implications pertaining to EFL teachers' professional development, teaching skills and students' learning environment.*

Keywords: *Adult learning, Pedagogical issues, Post-secondary education, Teacher professional development, Teaching/learning strategies*

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1. INTRODUCTION

Researchers' interest in the application of computer technology to the teaching of languages has increased during the past two decades (e.g., Alderson, 2019; Fidelia, 2019; Murray, 2018; Wedell, 2019). According to Markee (1997), the main obstacles to using CALI in EFL classes can be categorised into three categories: teacher-related, system-related, and school-related. The lack of information and understanding on the part of the teachers, as well as the fact that their own ideas and values do not align with their gender, age, or experience, are the main causes of teacher-related hurdles. They can think poorly of CALI and see it as adding to their workload. People could become enmeshed in the established and customary ways of doing things, making the new shift a threat to them (Wahaba, et al., 2019; Yani, 2019; Hassan and Aziz, 2019).

System-related obstacles result from a lack of mutual respect and trust between service providers and clients, such as between administrators and teachers (Hassan & Sajid, 2019). The central role of the teachers in the technological process, according to Wedell (2019), is necessary. Likewise, Carless (2011) emphasises the contextual-based approaches (using CALI in the teaching environment so that students may learn through practical and actual experience with a subject rather than just teaching theoretical parts like computers, the Internet and multimedia). The extensive field of linguistics requires paying more attention to the importance of using CALI that can contribute to language i.e. teaching reading, writing, listening and speaking skills according to the context (Waters, 2017; Zakaria et al., 2019). School or institutional- related barriers are mostly due to a lack of supportive culture for change in societies. There is also a very conservative atmosphere in educational institutions with a dearth of supportive management and inadequate school resources. In response to the COVID-19 pandemic and government or policymakers, districts and schools became more attentive to using CALI to teach writing skills and support EFL students. However, school heads and teachers were found not to have ample skills to implement CALI effectively to instruct their students (Altavilla, 2020; Saidi & Afshari, 2021).

The progress in EFL teaching in writing skills demands administrators as well as instructors to engage EFL students through distance- learning outside the classroom in Pakistan (Farooq & Soomro, 2018; Hassan et al., 2022). The use of computers, multimedia, and the Internet in this context may be advantageous for both English teachers and students. Teachers that are adept at using technology can be an effective force for change in the educational system by promoting and using these potent tools in Pakistan's English language instruction.

Governments and politicians may occasionally be compelled to adopt and use technical breakthroughs being used by other nations in the globalised globe (Ali et al., 2021; Iqbal & Rafi, 2018). In Pakistan, the government and policymakers have been for some time been planning to introduce the latest technologies in education, but the instability of the political situation prevents the benefits of this system (Farooq & Soomro, 2018). English teachers in Pakistan are split into two groups: (1) those who do not favour CALI in language instruction and want to stick with the conventional methods of instruction; and (2) those who favour CALI in EFL instruction. All instructors from primary to secondary levels receive regular computer training so they can submit assessment or evaluation reports online to the administration in the COVID-19 scenario (Chong, 2019). The emphasis on using computers for educational purposes is completely disregarded, though. EFL instructors cannot participate in computer training sessions offered by the district administration at the higher secondary level.

2. LITERATURE REVIEW

Unlike second language acquisition in general, CALI does not have a specific theory. However, the concept of CALI comes from various sources, including general learning theories like social constructivism, the community inquiry theory and the online collaborative learning theory. The



practical goal of CALI users and researchers is to produce and analyse learning opportunities. Through this, CALI pushes language instructors to consider a number of already established foreign language learning (hence forth FLA) acquisition theories. These existing theories were developed partially in response to meet the need to theoretically construct the role of CALI in FLA. This was the gap in which existing language learning theories had to be filled with the induction of computer technology so that multiple theoretical perspectives (social constructivism, community inquiry theory and online collaborative learning theory) could be merged. This induction of CALI into FLA theories can be the useful development of language materials and tasks. A similar theoretical idea was mentioned by Hubbard (2015) who suggested a typology for the connection of multiple theories to research in CALI and practice. In the past, much of the CALI work were theoretically produced without any particular framework or theory, though it was going through a great change.

Hence, the present study constructed the theoretical framework that could be used to produce better results in improving students' writing skills. This is where the present study revealed the theoretical contribution. The effect of cognitive theories, e.g., information processing and sociocultural theories like the activity theory and the online collaborative theory, is very much evident in connection with CALI (Mahdi & Al-Dera, 2020). However, in many of the earlier studies, either the quantitative or the qualitative method was used (see, e.g., Pathan, 2018; Riasati et al., 2018). This provided a methodological gap in using a mixed-methods research design in the present study, as recommended by Hubbard & Levy (2016). Exploring the impact of the main factors such as gender, age and experience on using CALI in teaching English in Pakistan is much needed (Memon et al., 2020). This can help policymakers, administrators and parents to decide how to make CALI more useful for EFL students' writing skills in English.

In Pakistan, employment and educational tests are based on writing, but due to the traditional method of teaching writing skills, students' writing skills are alarmingly weak (Haider, 2020). Although English language users in Pakistan exponentially increased to 59% in 2015 from 2% in 1961 (Dar & Khan, 2019), they still face issues in the English language, particularly in writing. These issues as dealt with in advanced countries, can be resolved if teachers and students make it a habit of applying CALI. Thus, The current study used the Penzu software in CALI to improve students' writing skills by involving teachers and English language learners. The class time at the higher secondary level lasts for only 40-45 minutes, and for this reason, EFL teachers cannot provide ample feedback to correct and provide comprehensive instructions to students' writing in a traditional classroom. Besides, students cannot get sufficient time to receive proper instructions (Ahmed & Qasim, 2019). These issues, generally arising in the classroom, make students incompetent in syntax, coherence, idea expansion, content selection, topic sentence, rhetorical conventions, mechanics, organisation, lack of vocabulary, and inappropriate use of vocabulary (Atique & Khan, 2019). In order to deal with these issues, the researcher used CALI with the additional use of the Penzu software in the computer labs. This software is particularly designed to help students in improving their writing skills. The use of Penzu in CALI saves students' as well as teachers' time and energy.

The review of the research discussed above provided a methodological, theoretical and demographical gap with reference to using CALI at the higher secondary level in Pakistan.

3. RESEARCH QUESTIONS

The following research questions are addressed in the current study:

1. What is the effectiveness of CALI in improving higher secondary school students' writing skills?
2. Is there any gender-based difference among EFL teachers' attitudes towards the use of CALI for writing skills?

4. SIGNIFICANCE OF THE STUDY

The present study would significantly encourage administrators to establish EFL teachers' professional development on practical grounds so that they can use CALI in EFL classes (Madhavi,

2019). This study highlighted the need for stakeholders, administrators and policymakers to invest in the technological infrastructure to fulfil the professional requirement.

The use of the Internet is an essential element for online teaching and learning. Shehzad et al. (2018) informed that the first international electronic network at the University College London began in 1973. For the last few decades, demand for the Internet is increasing globally in the realm of education (Shehzad et al., 2018; Rehman, 2020).

It is proved by several studies that CALI is an approach to teaching and learning in which the computer and computer-based resources such as the Internet are used to present, reinforce and measure the material to be learned (e.g., Tahira et al., 2020). This wave of internet usage particularly increased during the COVID-19 pandemic in Pakistan, where using the Internet was not in fashion before (Rehman, 2020). However, the sudden breaking out of the COVID-19 pandemic has changed the present cult of teaching methodologies in Pakistan. The present study contributes to these emerging trends in Pakistan by using CALI and the use of Penzu software. Therefore, the integration of computer technology has been considered suitable in the current scenario.

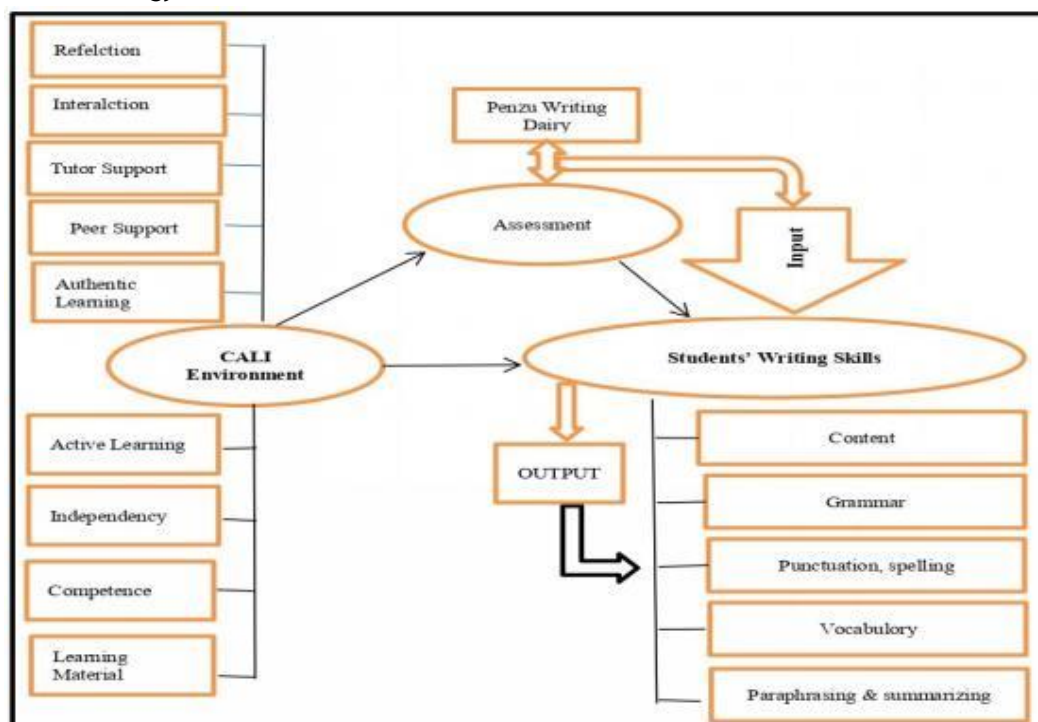


Figure 1. Theoretical Framework

5.METHODOLOGY

The study was experimental in nature in which 40 student participants were the population selected through purposive sampling technique. The experimental group were given training before the study regarding the use of the software (Penzu) while control group was provided no treatment. Hence, they attended EFL classes according to their routine. The details of the training are given in Table 1 below.

Table 1 Time Table to Train Students to Use Penzu (N= 40)

Lectures	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Contents	Introdution to Penzu	Adding new entries	Solving multiple choice test	Cloze/ Fill in the blanks	Open-ended tests	Reflecting on writing
Time	10-11 am	10-11 am	10-11 am	10-11 am	10-11 am	10-11 am

The students in the experimental group were given lectures on how to use Penzu for six days. On the first day, students were introduced to Penzu and its functions and on each day one hour of training

was given. Students learned how to log in and how it works for improving writing. On day 2, they learnt to make new entries and blogs. They made their entries and revised this practice thrice. On day three, they were told about solving MCQ tests. On day 4, Cloze/fill in the blanks questions were solved by them and on day 5, they learned about writing open-ended questions and on the last day, they learnt to reflect on their writing. Each day, the students logged in and made new entries and hence, they were ready for the experiment. Table 2 shows quantitative sampling. Using the purposive sample method, the study's participants were chosen. There were a total of 20 participants in each group because the language laboratory for the experimental group could only hold that many (twelve males and eight females) and the control group (twelve males and eight females). When enrolled in the ICS (Intermediate in Computer Science) course, which attempts to teach the students the fundamental uses of computers for word processing, sending emails, etc., they had just recently begun to use computers. The experiment's pre- and post-testing protocol is provided in Table 2.

Table 2 Pre-/Post-tests' Time and Content

Type of test	Time of test	Topics/items
Pre-test	Beginning of experiment	Criterion-referenced multiple-choice cloze/fill-in-the-blanks Open-ended Open writing (How is school life? Describe in your own words)
Post-test-I	After 8 weeks	Criterion-referenced multiple-choice cloze/fill-in-the-blanks Open-ended Open writing: You visited a zoo in your town with your friends. Write your experience of how you planned and how you enjoyed yourself?
Post-test-II	At the end of the experiment	Criterion-referenced multiple choice, cloze/fill-in-the-blanks, open-ended and open writing: What is your future plan after your exams? What and do you want to be and why?

5.1 Validity of the instruments

Reliability is referred to as the accuracy and consistency of the measuring instrument. It is also alluded by research scholars like Greener (2008) and Harvey (2018) that the instrument, procedure or strategy utilised in the study reasonably estimates the suggested idea. On the other hand, Ahmad and Rao (2019) upheld the significance of face validity.

5.2 Test-validity and reliability

Tests selected in the study were sent to three experts in mathematics from the University of Sargodha and the Mir Chakar Khan Rind University in Sibi, Pakistan. They were full professors. The tests were reviewed by them, and after two weeks, their reviews were received with positive comments.

They advised examining test-retest reliability because results obtained from measuring a construct that researchers believe to be constant over time should likewise be constant over time (Cacioppo & Petty, 2019). Using the measure on a group of people once, using it again on the same group of people later, and then analysing the test-retest correlation between the two sets of scores are necessary for evaluating the test-retest reliability. The usual method for doing this is to plot the data in a scatterplot and calculate Pearson's *r*. The Rosenberg Self-Esteem Scale was given twice, one week apart, and the association between the two sets of scores is shown in Figure 3.0. This data has a Pearson's *r* of +.95. Generally speaking, a test-retest correlation of +.80 or more is seen as a sign of good reliability.

5.3 Data Collection

Students in the CALI grammar instruction group for writing skills received computer-assisted language learning grammar instruction from the Interactive online programme in the classroom. Students logged in to Penzu as they were already given the training to operate Penzu. All twenty students made their diaries for understanding the verbs in tenses, conditional sentences and passive forms,

sentence completion and use of adverbs and adjectives. Every student created a schedule of his/her own. This permitted the students to work even outside the classroom. Each student practised daily on each grammatical item and writing task. In the third week, they made a general diary for open writing on travel, school, work, friends and family. Students were free to look back in their diaries to see how they had progressed. On week 8, post-test-1 was conducted. All twenty students completed their open writing test, and their written draft was printed out for assessment, and the results were compared with the pre-test results. Students continued their similar practice, and post-test-II was conducted. Again, the students' written draft was printed for assessment and compared to see any improvement in writing.

5.4 Data analysis

The data were analyzed by using the IBM Statistical Package for Social Sciences (SPSS) (Version 28). To assess the open writing, first, the errors of the pre-test from both the experiment and the control groups were recorded, coded, graded, and input into the software package SPSS. The number of initial postings and reply postings was calculated. An independent samples t-test and paired samples test were conducted to examine the differences between those two groups. The areas of grammatical errors were analyzed.

6. RESULTS

Table 3 Independent Samples' t-test (Pre-test) Analysis of the Gain Score Difference in Total

	Group	N	M	SD	T	df	Sig.
Total diff.	Control	20	8.000	4.123	1.445	32	.160
	Experimental	20	5.35	6.623			

All effects were reported at the 0.5 level of significance in Table 3 above, which displays the statistical findings from the pre-test. The reported difference in gain scores between the control and experiment groups wasn't statistically significant; $t(26, 545) = 1.445$, $p = .160$, and $r = 0.25$ were the relevant numbers. The average scores were 5.35 (for the experimental group) and 8000 (Control group). There was no discernible difference in the acquisition of writing correctness, according to the results of the t-test study.

Table 4 Independent Samples t-test (Post-test-1) Analysis of the Gain Score Difference for test-1

	Group	N	M	SD	t	df	Sig.
Total diff.	Control	20	2.432	2.221	-.745	32	.465
	Experimental	20	3.057	2.322			

The statistical findings of test-1, where all effects were reported at a 0.5 level of significance, are shown in Table 4. Despite having increased, the reported gain score difference between the control and experiment groups on the pre-test (written) was not statistically significant; $t(32) = -.745$, $p = .465$, and $r = 0.13$. The experimental group had a mean score of 3.057, and the control group had a mean score of 2.432 (Control group). The t-test analysis results showed that there was no discernible difference in the acquisition of writing accuracy.

Table 5 Independent Samples' t-test Analysis for the Post-test-2 Difference

	Group	N	M	SD	t	df	Sig.
Total diff.	Control	20	3.294	1.794	4.002	32	.001*
	Experimental	20	1.764	4.892			

All effects were presented at the 0.5 level of significance in Table 5, which displays the statistical findings of post-test-2. The reported difference between the gain scores for the control and experiment groups on post-test-1 was statistically significant ($t(20, 228) = 4.002$, $p = 0.001$, $r = 0.58$).

The mean scores were 1.764 (for the experimental group) and 3.294 (control group). Comparatively to the control group, the experimental group performed better. According on the results of the t-test-1 analysis, the researcher should reject the null hypothesis. The effect size showed that the participants' scores in the experimental and control groups differed by a significant and significant amount.

Table 6 Independent Sample's t-test Analysis for the Post-delayed Test difference

	Group	N	M	SD	t	df	Sig.
Total diff.	Control	20	5.094	0.594	4.211	36	-.002*
	Experimental	20	1.430	3.692			

The statistical findings of the post-test are presented in Table 6, where all effects were reported at the 0.5 level of significance. The reported difference between the gain scores for the control and experiment groups on post-test-2 was statistically significant ($t(19.118) = 4.211$, $p = .002$, $r = 0.59$). The experimental group's mean score was 1.430, whereas the control group's score was 5.094 (control group). The experimental group outperformed the control group in terms of scores. The researcher should reject the null hypothesis, according to the findings of the post-delayed test analysis. The effect size showed that the difference between the participants' scores in the control and experimental groups implies a more significant and substantial effect.

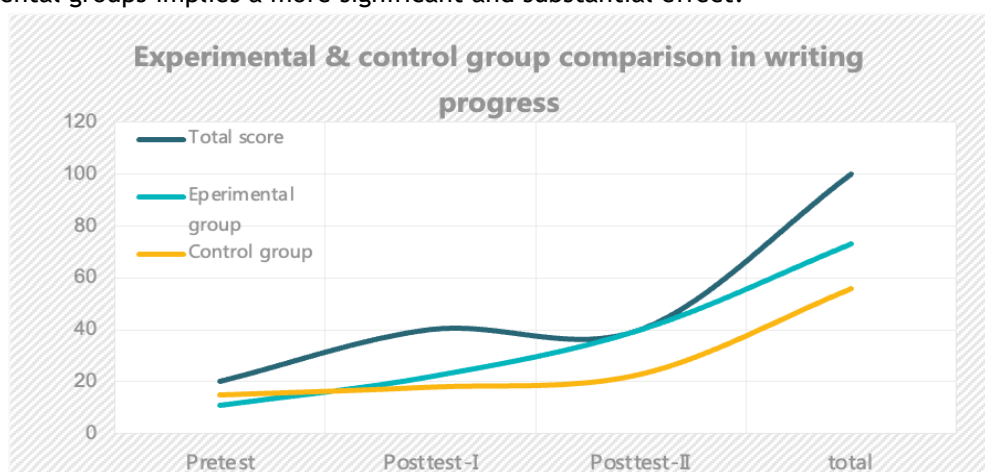


Figure 2. Comparison of Students' Writing Progress over Time

6.1 Control group students' results

In their writing examples that were kept in their notebooks, students' mistakes in the intended linguistic elements were noted, and repairs were offered. For the control group, the accuracy in writing was calculated as a percentage of correct usage, so if a student used the proper phrase seven times out of 10 times, the accuracy rate was calculated as 70%. Also, the pre-test and two follow-up tests' descriptive statistics were calculated individually, as shown in Table 8. On the pre-test, the control group students' average mistakes in using the targeted language forms were 5.75.

To track the writing accuracy over time and analyse any statistically significant differences, a two-way repeated measure ANOVA test was used. Two specialists from the university's mathematics department examined the exams' suitability and outcomes.

Table 7 Descriptive Statistical Results for Mean Scores of the Control Group's Tests

Group	N	Pre-test		Post-test-1		Post-test 2	
		Mean	SD	Mean	SD	Mean	SD
Control	20	83.20	9.40	86.10	13.90	96.44	9.23

Table 7 displays the average % for the three tests that were performed throughout various time frames. The average scores show that although students in the control group first seemed to be stronger, there was not a significant difference later on. On post-test-I, they exhibited a modest improvement, and in the second post-test, this group did not demonstrate any appreciable improvement in writing accuracy.

One pre-test, post-test-I, and post-test-II scores for the control groups were further investigated using a series of ANOVAs. A two-way repeated measures ANOVA was conducted because the results of the one-way ANOVA did not indicate any significant differences among the groups $F(3, 58.20) = .427, p = .76$. The dependant variable for the test results was added, along with time and CALI as the test results was added, along with time and CALI as independent variable. The following Table 9 shows the results of the analysis.

Table 8 Two-way ANOVA Results for Control Group Students

Source	Df	F	p
Between subjects			
TDM	2	.427	.76
Within subject			
Time	3	16.13	.000
Time x TDM	9	1.819	.141

TDM= teacher- directed method

Table 8 shows that there is no significant relationship between time and the use of teacher-directed methods. However, a significant difference is noted regarding time and within the subjects. The impacts are observed. The control group did not show such consistency in improvement in writing accuracy (p value= .76). Time and CALI also showed a difference of effect (9) with a frequency of 1.819 and $p = .141$, which means that the teacher-directed method (traditional method) had no positive effect on students' accuracy. The control group, which started by showing a higher rate of writing accuracy at the beginning, did not show a significant variation in writing accuracy over the total course of the research.

6.2 Experimental group students' results

As with the data of the experimental students, students' errors in the targeted linguistic features were also identified first. Then, they did corrections on their own by helping one another through emails and observed their improvement by looking through their online diary on Penzu on their computers. Unlike the experimental group, the control group did not prefer to receive computer-directed instructions. For both groups, accuracy in writing was measured as a percentage of proper usage; for example, if a student used the correct phrase seven times out of ten times that were required, their accuracy rate was 70%. Descriptive statistics in the pre-test and the two post-tests for each group were also computed independently, as previously described.

Due to this, a two-way repeated measure the writing accuracy was tracked over time using the ANOVA test, and the statistically significant difference was examined. Two specialists from the mathematics department at Khwaja Fareed University of Engineering and IT again reviewed the tests' validity and outcomes. Table 10 displays the statistical findings for the experimental group's test score means.

Table 9 Descriptive Statistical Results for Mean Scores of Experimental Group's Tests

Group	N	Pre-test		Post-test-I		Post-test-II	
		Mean	SD	Mean	SD	Mean	SD
Experimental	9	87.19	1.40	90.11	9	99.54	9.33

Table 9 shows the mean percentage for the four tests conducted over different periods of time. The mean scores reveal that students in the experiment group were steady in development in all two tests. They showed a slight decline in post-test-I but revealed significant differences or development in obtaining writing accuracy in post-test-II. The students revealed an observable accuracy rate in

their writing between the pre-test and post-tests-I & II.

Table 10 Two-way ANOVA Results for Experimental Students

Source	Df	F	P
Between subjects			
CALI	2	.730	.014
Within subject			
Time	3	7.413	.012
Time x CALI	9	4.304	.012

Table 10 shows the mean % for the (three one pre- & two post) tests conducted over different periods of time. The average test results suggest that the experiment group's children made consistent progress across all three assessments. In post-test-I, they indicated a little fall, and in post-test-II, they indicated a substantial difference or improvement in writing accuracy. Between the pre-test and the post-tests, I and II, the students' writing accuracy rate was noticeable. According to Table 11, there is a substantial correlation between the amount of time and the students' kind of instruction (CALI). One-way ANOVAs were carried out, which also demonstrated that students displayed a statistically significant difference in terms of gaining writing accuracy with regard to time and within the subjects; the impacts were seen. According to one-way ANOVAs, pupils significantly improved their writing accuracy over different time periods (p value = .014). Time and CALI also showed a difference of effect (9) with a frequency of 4.304 and $p=012$, which means that CALI had a positive impact on students' accuracy.

The results reveal that, although the students in the experiment group were seen to have no significant accuracy rate in time 1 (post-test-I), they continued to significantly acquire a higher rate of writing accuracy in time 2 (post-test-II).

Table 11 Comparison of eliminated Errors between the Experimental & Control Groups

Target	Experimental group	Control group
Eliminated the targeted errors.	14 (73%)	9 (41.93%)
Did not eliminate the targeted errors.	6 (29.26%)	11 (58.06)

Table 11 shows that out of the 20 students who received instruction through CALI, 14 (73%) students could eliminate their targeted errors in post-test-II. Only 9 (41.93%) students who received teacher-directed instructions (control group) were able to eradicate all their targeted errors in the last post-test-II. The following Table 13 describes these statistical results. In the experimental group, a few students (6 out of 20) were unable to eradicate all their targeted errors, which reveals that receiving CALI may not help all the students to eradicate their errors. On the other hand, 11 students in the control group were completely unable to eradicate all their targeted errors, which indicates that receiving teacher-directed instruction is not helpful for students to eradicate most of the targeted linguistic errors.

Table 12 Multiple Regression Analysis Showing Contribution of Variables in the Use of CALI

Variables	B	T	R	R ²	df	F
Gender	.23	.13				
CALI	.31	.27*	.		2, (198)	
Age	.25	.15				
CALI	.31	.29*	.21	.045	2, (188)	20.17**
Experience	.26	.14				
CALI	.30	.28*	.		2, (192)	



Note *** $p < 0.01$; $N = 180$.

The results of the summary in Table 13 indicate that all the independent variables, when combined, yield a multiple R of .21 and R^2 of .045 [$F(2, 198, 188, 192) = 20.17^{**}$, $p < 0.01$] on the contribution of gender, age, and experience, as well as all the independent variables, to the prediction made using CALI. This shows that the total variance in how effectively EFL learners assessed CALI to be enhancing their writing skills accounted for 4.5% of all the independent factors.

Gender was found to be a significant predictor of the influence of CALI [$\beta = .23$; $t = .27$; $p > 0.05$]. This implies that gender differences significantly predicted the use of CALI among EFL teachers from the public and private higher secondary schools in Central and Southern Punjab of Pakistan. Thus, the null hypothesis H_0 , that there is no gender-based difference among EFL teachers in using computer technology in EFL classes at the higher secondary level institution in Pakistan, is rejected.

7. DISCUSSION

Statistical analysis and the t -test scores of the data revealed that the use of CALI for teaching purposes might have good and flourishing impacts on students' learning. It is also a fact that its use has been linked to some issues like lack of personal possession of up-graded versions of laptops, difficulty in the English language, unsuccessful examination system, lack of time for teachers, dearth of skilled persons, breakdown of electricity, non-acquaintance of teachers with computer technology, the unwillingness of teachers, the embarrassment of teachers from students' advanced skills in information technology, poor internet links, economic problems, the safety of equipment, lack of training, lack of inspiration, and lack of administrative support.

Some components of the study can be adjusted as a result of the study's findings in order to enhance students' writing abilities or for future research. In order to generalise the findings, other researchers may decide to conduct the study at various levels and sites. In comparison to the present study, the results suggest that a more broadly representative sample would yield better outcomes for students' writing abilities. The usage of CALI by the teachers should be advantageous since it will allow the classroom to be more student-centered because the pupils did benefit from the computer-assisted language instruction that was offered. There are some theoretical ramifications of the current study in this regard.

The present study investigated the effect of using CALI on the writing achievement of Pakistani EFL students at the higher secondary level. The study provided theoretical implications to the activity theory first. It was assumed that teaching writing by using CALI within the activity-based framework through CALI would enhance students' writing performance. The findings pertaining to this revealed that activity-based CALI would significantly enhance Pakistani EFL learners' writing skills. The findings provided evidence that the students in the experimental group performed substantially better in the writing post-test than the pre-test after receiving activity-based CALI instruction.

These findings also show that the students made noticeable progress in writing as a result of using different mediating elements of this combined instruction to transform their writing activities by providing them with various tools (Penzu) and resources. These results can be justified and are in accordance with what the literature review shows regarding the nature and influence of CALI and the social constructivist theory, of which activity theory is part of it in writing achievement (e.g., Madhavi, 2019; Jabeen, 2020). According to social constructivism, knowledge is developed from individual interaction and learning is considered collaborative learning. The use of CALI expedites this collaborative effort through Penzu. Besides, CALI may provide students autonomy to continue their learning and continue their activities collaboratively. Constructivism also says that students gain knowledge on the basis of previous learning experiences. In this context, the study revealed that CALI could help students to improve their knowledge by comparing their previous writing drafts in their diaries created in the Penzu.

Also, the sociocultural element of CALI education can be credited for its efficacy when learners participate in group activities and practise in social settings. Social constructivism's central tenet is this. By a continual reciprocal interaction in the learning community, this component demonstrates how learners can help each other and, at the same time, benefit from other sources or artefacts and



community members to reach their goals. In fact, by allowing the students to pursue multiple goals at once, CALI can mediate the writing activities of the students in a number of ways within the activity-based framework. As a method of instruction, CALI encourages a range of learning activities and fosters teamwork, cooperation, and engagement inside and beyond the classroom. This would be an additional advantage of using CALI.

With emerging technological developments and the evolution of technology use in language learning, EFL learners become the centre of the learning process as they can have control over learning because language learners construct their new knowledge on the basis of prior knowledge or experience. Therefore, the learner's cognitive operations should be taken into account in the language learning process. Social engagement is also crucial for the development of L2 knowledge because it gives students the chance to expand, verify, and adjust their understanding of the target language. We are prompted to use a more socio-cognitive approach to CALI, such as social-constructivism, in light of the advent of internet technology, which encourages human-human contact (synchronous or asynchronous) in language learning.

7.1 Pedagogical implications

The present study provides pedagogical implications pertaining to teaching English in EFL classrooms at the higher secondary level. The instructors in future classes may require additional supplementary instruction as regular assignments with grades. Based on the students' answers to the short answer questions, the researcher believes that mandating that the CALI be graded alongside all other regularly assessed assignments rather than as an optional extra will hold the students accountable for doing well in CALI and make it a higher priority than it was in the study. The students should put in greater effort to ensure that all components of CALI are completed because the CALI grades could have an impact on their grades comparable to all other assignments in the class (Jabeen, 2020; Hakim, 2020).

7.2 Practical implications

It is advised that more research be done using CALI because of the way that technology has changed how we teach and learn languages. In this study, the lessons given to the experimental group were made available as additional language time rather than being integrated into the normal courses. Further research is needed to understand the impact of CALI, which might be used in regular classes, and the learning preferences of the students.

To ensure that students still have human interaction, CALI should be incorporated into conventional classroom settings where the teacher is also accessible for additional help and queries.

By allowing both quick and slow learners to study or revisit the content at their own pace, CALI can maximise learners' autonomy. CALI can provide assistance in the structure of the lessons since it enables learners to get immediate feedback which is the basic purpose of CALI in almost all situations. The implementation of CALI may provide a positive impact on EFL students' writing skills at the higher secondary level in Pakistan, which is why CALI was investigated in the present study. Increasing accuracy in writing may help EFL students to get through their competitive examinations held every year in Pakistan. Besides, more experiments at different levels of education in Pakistan would determine if there was an improvement in students' writing proficiency and test scores with the use of CALI as the method of instruction. The researcher anticipated the evidence from the present research which may be of interest to school administrators, teachers and policymakers. The findings of the present study might also impact the strategies used to assist EFL learners in building their vocabulary and literacy skills by increasing their proficiency level in English and might also contribute to students' academic success. Continuous professional development of EFL teachers at the higher secondary level who teach EFL learners may improve their level of instruction. This would directly impact EFL learners' language proficiency.


7.3 Conclusion

To address the domains that could support the effectiveness of implementing CALI for the overall language proficiency of EFL learners, continuous professional development needs to be provided to the teachers and the administrators. These strategies can take them back to their classrooms to engage students effectively. District administrators and policymakers can be informed of the data

collected from various investigations, through which they will come to know how EFL students can be helped to improve their language proficiency for their academic success. Moreover, the policymakers, administrators and EFL teachers may conduct evaluations and surveys, the effective input of which could be obtained to make changes where needed. However, like many other developing and developed countries across the world, Pakistan had to face the impact of the sudden COVID-19 pandemic. Finally, as the pandemic worsened, there was a demand to keep EFL and other teachers considerably skilled enough to use educational technologies and tools to fulfil students' academic needs in Pakistan. The present study has provided evidence that using CALL would be effective in this situation.

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