**Educational Administration: Theory and Practice**
2024, 30(10), 2639-2649
ISSN: 2148-2403
https://kuey.net/

**Research Article**

# Efficacy of Classroom Climate on English Language Acquisition in a Content and Language Integrated STEAM based Environment among High School Students

Sameena Parveen[1*], Dr. S. Chamundeswari[2]

1Ph.D. Research Schola parveen.sameena82@gmail.com
2Principal N.K.T. National College of Education for Women, Chennai rajchamu2006@yahoo.co.in, +91 9790953062

**Citation:** Sameena Parveen, (2024). Efficacy of Classroom Climate on English Language Acquisition in a Content and Language Integrated STEAM based Environment among High School Students, *Educational Administration: Theory and Practice*, 30(10) 2639-2649, Doi: 10.53555/kuey.v30i10.11123

**ARTICLE INFO**

**ABSTRACT**

The present study investigates the relationship between classroom climate and English Language Acquisition among students of standard IX studying under the Tamil Nadu equitable education syllabus. An experimental method is used to select a sample of 64 students. The research tools used are Classroom Engagement Adapted and modified from the Classroom Climate Scale (2018) by the Harvard Graduate School of Education. The intervention used in the classroom consisted of Content and Language Integrated Learning in a STEAM based environment. The results of the statistical analyses show some significant correlation between Classroom Climate and English Language Acquisition among the students. This indicates that a few factors play a very important role in English Language Acquisition among students.

**Key Words:** Classroom Climate, English Language Acquisition,Content and Language Integrated Learning (CLIL), STEAM (Science, Technology, Engineering, Arts and Mathematics) based environment.

## 1. Introduction

Language is the rudimentary medium in which a learner cognates, participates, structures knowledge and creates identities for specific content. As language development goes 'hand in hand' with social communication, a good classroom environment with precise language goals and purposeful interaction, acts as an important context that increases or restrains language growth. In encouraging climates, the goals that teachers set are aspirational, designed for communication and would also lower anxiety. Amid growing multilingual enrolment and increasing proficiency gaps, English Language Acquisition is largely considered as being important not only for the curriculum but also better Classroom Climate. Yet, the accurate ways that could be adopted to attain better English Language Acquisition are not still comprehended in most educational scenarios.

The Classroom Climate has been considered to influence teacher-student interactions, peer relationships, expectations and norms. On the other hand, slow vocabulary gains, fluency and less communicative competence reflects less suitable environments to practice language. In the age of multilingual classrooms and global changes, English Language Acquisition plays a major role. There has been a long-time relationship between Classroom Climate and English language Acquisition. Traditional language instruction usually isolates English language from the subject content who results in temporary and superficial language acquisition and limited transfer to real-world communication. (Cummins, 2008).

## 2. Need for the research

Over the past few decades, there has been more focus on the climate of the classroom, especially since the move towards holistic education that prioritises emotional and social growth as well as intellectual success. The idea came about in the middle of the 20th century because learners wanted to know more about how the environment in schools affects learning. There is more and more evidence that the classroom climate affects students' motivation, behaviour, and academic achievement. Because of this, teachers and policymakers now know that they need to create environments that are respectful, supportive, and good for learning (Eccles and Roeser, 2011). Recent changes to education focus on both the academic curriculum and the emotional and

social environment in which learning takes place. This shows how important it is to have a pleasant classroom climate. Proficiency in English is, of late, linked with academic excellence, socioeconomic development and engagement in global communication (Graddol,2010). The study of English Language Acquisition (ELA) bears utmost importance in present day education, especially in multilingual contexts where English is considered as both a second language and a medium of instruction (Annamalai, 2004). Furthermore, in emergence of globalisation and technological advancement, the role of English in accessing digital content, higher education, and international employment has increased (Crystal, 2012). This makes ELA an important aspect of inquiry for researchers and other stakeholders. There is also a pedagogical shift in research towards integrated and language based contextual learning. This reiterates the need to do more research that analyses how language acquisition can be scaffolded through project and activity-based method where academic language is a barrier. It can be stated that this study addresses a critical gap by evaluating the efficacy of CLIL-STEAM learning environment on English Language Acquisition on secondary grade students. It focuses to contribute empirically based insights to curriculum design and policy, especially in alignment with India's NEP 2020, which calls for multidisciplinary, language-inclusive, and experiential learning environments. As education transitions into an era of skill-based learning, critical thinking, creativity, problem solving and analytical reasoning have scored as core competencies for the 21st century skills (Beers, 2011). These abilities cannot be nurtured through rote learning; decontextualised and in isolation. Integrating ELA is the answer to improve the potential of solving the issue of using inquiry driven learning. (Quigley et al., 2019).

## 3 Review of related Literature

Studies reviewed pertaining to the present study have been compiled and presented below under appropriate headings.

### 3.1 Studies Related to Classroom Climate and English Language Acquisition

Siyawik et al. (2014) studied the relationship between students' perceived EFL classroom climate and their achievement in English language using a sample of 200 grade X students. The results showed positive and significant relationships among students' perceived EFL classroom climate variables and their English Language Achievement score. The findings also revealed that classroom climate variables, when combined together, predicted students' achievement results to a significant 20.5%. Which special reference to each variable, 'task challenge' was found to be the most predictor of English Language Achievement. It was also found that classroom climate variables when presented in a collective manner, predicted students' English language achievement significantly. The investigators recommend that EFL teachers be proactively aware of the students' classroom environment and ensure that positive and motivating conditions be created. They also add that teachers need to be trained on both the theoretical and practical importance of classroom climate.

Zhang (2021) presented an empirical study of the significant development of multilingualism studies, creating a connection between translanguaging space and positive 'classroom climate'. This paper attempted to allow for students' emotional expression and support of their emotions in order to benefit English as a foreign language in the context of the Chinese language. The data thus collected is treated as visual, multilingual and multimodal, 'student made artefacts called emotional curves.' Such curves create a translanguaging space which helps students adopt multiple linguistic and semiotic resources to emote and create personal identities freely and creatively. This paper also highlighted the 'transformative power' of translanguaging space and advocates acknowledging and supporting students' emotions to have better teacher-student relationships and create a harmonious classroom climate

Joulide et al., (2020) studied the role of correspondence of high-school students' self determination and classroom climate with reading achievement. They explored the relationship between Iranian High School students' self-determination, and classroom climate with their reading. They used the IOWA self-determination scale, classroom climate questionnaires and a validated researcher -made test. The results projected a positive relationship between self-determination and reading ability. The highest correlation was between Task Orientation and Equity and the least correlation was between students' reading ability and unfriendly behaviour. They observe that this could be due to the fact that classroom climates that demotivate learners through the use of tasks that are either too high or too low when compared to their level of learning, or needs and interests where a teacher provides a sense of non-inclusivity. Their research results also highlighted that teachers' skill in orientating tasks can improve reading achievement score and make the classroom a better motivated place for learning.

Fiksl, M., et al., (2017) provide focused research on how students envisaged classroom climate, and on their interest in the content knowledge in the subjects of Science, Engineering and Technology among 92 students belonging to grades Six and Seven. They used the classroom climate and student' interest survey tool. The results showed that there were changes in the way the students looked at the classroom climate when innovative teaching and learning methods were used. The analysis of their results showed improvements in the perception of classroom climate and concluded that when variables were introduced in a statistically controlled environment. It was also concluded that group work encouraged better collaboration and placed

higher importance on friendship and peer learning. Climate in classrooms could change created at schools with positive commitment and approach towards the task.

### Evaluation

The reviewed studies show that classroom climate plays a key role in bringing out the positive learning outcomes among students of English language learning. Factors such as task orientation, equity, emotional support and peer cooperation appear favourable for English language acquisition. The investigators predict the power of the classroom variables and like 'task challenge and even extend it to the need of a translanguaging space that could imbibe emotional expression and identity of a student. They further stress upon the factor of self-determination that would boost the readers' achievements while the vice versa would happen in a demotivating classroom climate. These findings indicate that classroom climate is not an inert factor but a dynamic aspect that is critical to maximizing English Language Acquisition.

## 3.2 Studies related to English Language Acquisition

Cobb (2007) undertook research on how effectively lengthy reading helps second language (L2) learn new terms. The study's purpose was to find out if reading a lot may help people learn new words, especially beyond the basic 2,000-word family level, which is typically regarded to be the minimal level for independent reading. The study didn't indicate how many people were in the sample, but it used corpus-based analysis and vocabulary profiling methods to figure out what kinds of vocabulary different reading materials needed and how they affected students' vocabulary growth. Cobb found that reading a lot does help pupils learn new words, but it doesn't help them learn words that aren't used very often. It's especially hard for to find and recall less common words solely by reading because most reading texts don't use them very often. The study proposed integrating computer-assisted vocabulary instruction (CAVI) to extended reading because of this. CAVI tools can help students recall new words better by offering them focused exposure, repetition, and interactive interaction with vocabulary that isn't used very often. By combining the broad exposure of extensive reading with the deep and focused instruction of digital vocabulary, language teachers can make acquiring a second language vocabulary more balanced and effective.

McQuillan and Krashen (2008) studied how prolonged reading can help people who are learning a second language learn new words. The study didn't disclose how many people were in the sample, but it did say that reading a lot, especially levelled literature, can help pupils learn a lot of new vocabulary. The study found that students who choose to do a lot of reading on their own can see terminology in real-life circumstances several times, which helps them acquire languages easily. The authors added that children should be encouraged to join extended reading programs that use texts that are at the proper level for them. This would help them develop their vocabulary and language skills in general.

Schmitt (2014) studied how essential the size and depth of a second language learner's vocabulary are for their level of competency. The study didn't say how many people were in the sample, but it did reveal that vocabulary breadth (how many words you know) and depth (how well you understand what words mean and how to apply them) are particularly crucial for being good at a language. The results showed that children who had a bigger and more varied vocabulary were better at reading, writing, listening, and speaking. It said that schools should use word mapping, semantic mapping, and context acquisition to assist kids get better at all parts of language.

Garnier and Schmitt (2015) studied how people who are learning a second language learn phrasal verbs, emphasising on the challenges that polysemous phrasal verbs cause. The study didn't disclose how many people were in the sample, but it did reveal that often have problems comprehending and utilising phrasal verbs appropriately because they can signify more than one thing. The more saw and used it, though, the better they got at understanding it. The researchers came up with the PHaVE (Phrasal Verb) List, which is a teaching tool that lists the most prevalent phrasal verbs and their meanings. They said that utilising it in language classrooms could help pupils get better at using phrasal verbs.

Alharbi (2021) looked at the challenges that EFL students at King Saud University were having in a qualitative case study. Ten students from the worst 20% of their English classes were chosen and interviewed in depth. The results showed that 80% of the people who took part thought their English was "very good," while 20% thought it was "average." The results also demonstrated a strong correlation between how good the students' English was and how much they wanted to learn for school and job. The study also underlined how essential social and mental variables are in language learning. It said that ' attitudes and motivation are a big part of how they learn a language. The ideas included offering kids who were having trouble one-on-one aid, making the classroom a safe place to learn, and doing things to fit the needs and goals of each student.

Eslit (2023) studied how college students in Philippines who were learning a new language changed and adapter after the pandemic. The study used qualitative research, including as interviews and document analysis, to look at how students adapted to the transfer to online and remote learning. The results showed adapted to the transfer to online and remote learning on their own. Is becoming more frequent, and that talking to other people is vital for learning a language. Respondents claimed that they were less driven and involved abut they also showed strength and attempting new approaches to learn. The study declared thatdigital tools help students work in a much free environment and help them make it simpler to converse

with other people and learn better. The results pertain more to the teachers, lawmakers and policy holders who wish to support language in new learning environments.

**Evaluation**

The body of literature available on English language acquisition (ELA) for review demonstrates how learners can perform well in the presence of factors such as motivation and confidence, paired with the fact that greater the exposure to the English language, especially the vocabulary, the better the level of acquisition. Specific activities, especially interactive in nature, helped students help them reach their goal of English language acquisition quicker. Broad vocabulary, deeper focus and varied and interesting approaches and methodologies are said to be successful in attaining the goal of language acquisition.

### 3.3 Studies related to English Language Acquisition and Content and Language Integrated Learning

Ouazizi (2016) studied how CLIL (Content and Language Integrated Learning) influences students' capacity to learn English and do maths. The study employed a mixed-method ethnographic approach that includes classroom observations, voice recordings, a maths test, questionnaires, and teacher evaluations in two Belgian secondary schools—one employing the CLIL paradigm and the other a traditional model. The results showed that CLIL students were better at both the subject matter and their English language skills than pupils who weren't in CLIL. CLIL students, in particular, understood concepts better and fared better on a maths test that focused on quadratic equations (mean score: 9.15 vs. 7.8). The CLIL group was better at speaking and writing English, used it correctly, and used it more outside of class. This suggests that their ability to communicate had increased. The study found that CLIL made group learning and scaffolded instruction better, which made students more interested in the language and material. Also, pupils' attitudes towards English and learning maths in English improved a lot. The study indicated that CLIL speeds up language and cognitive development, and this is backed up by both neurobiological and pedagogical mechanisms. Ouazizi said that CLIL should be utilised more often because it helps with structure, thinking, and motivation. But the study concluded that further research is needed to find out what the long-term implications are and to make sure that the results are true for more people.

Kapoor (2022), in the research on *Content and Language Integrated Learning (CLIL): An ELT Methodology in the Indian Context*, examined using CLIL as a feasible way to teach English in Indian classrooms where many languages are spoken. The vocabulary acquisition assessments and feedback from students were employed in this mixed-methods study with upper primary pupils in Karnataka. The CLIL intervention demonstrated that students got better at writing and understanding, especially when they utilised language that was specific to the subject. Students were more interested in what they were learning when language was taught in a way that related it to other topics. The report said that CLIL should be adapted to diverse areas and that national curriculum and teacher training programs should include CLIL methodologies to help pupils learn two languages.

Wang (2023) showed how Content and Language Integrated Learning (CLIL) changes the way university students in countries that don't speak English learn English. The researchers read peer-reviewed journal studies that looked at how CLIL affected three primary areas: students' overall English skills, their receptive and productive language skills, and their attitudes towards learning English. The study found that teaching English with CLIL helped students get better at it, especially since it made them more interested in and driven to learn the language. However, the difference in English skills between pupils who were taught in CLIL and those who weren't was not statistically significant. Also, not everyone got better at language in the same way, which shows that the CLIL method may help some parts of language more than others, like speaking or writing. It's crucial to remember that while a lot of students reported they were more motivated and eager about learning English through CLIL, some also had problems transitioning to the integrated learning paradigm. This shows that the response was mixed. The study highlights how crucial it is to find useful approaches to teach that can help with these issues. It finishes with helpful tips on how to employ CLIL in college classes, especially in China's higher education system, where these kinds of methods could help students learn both the language and the topic.

Sheikh (2023) wrote a study called "Assessing the Feasibility of Using CLIL in the Indian Context." In it, he looked at how practical it would be to utilise CLIL in grades 6 and 7 schools in Maharashtra and what the effects would be. The experiment had 80 students, who were divided into two groups: CLIL and non-CLIL. Through pre- and post-testing and observations in the classroom, we saw that the CLIL group made large gains in their English vocabulary, sentence construction, and grasp of the subject. Students were more interested and concentrated while they were learning in a CLIL way. The study found that CLIL is not only doable in India, but it is also a good approach to learn in two ways. Some suggestions were to create multilingual teaching frameworks and invest money on teachers' professional development.

Memon et al. (2023) studied how Content and Language Integrated Learning (CLIL) influences the vocabulary learning of English as a Foreign Language (EFL) students at Cadet College Petaro in Pakistan. The researchers employed a mixed-methods strategy, which included both qualitative interviews with English teachers and a pretest-posttest experimental design, to find out how much vocabulary kids gained. There were 90 cadets, and they were divided into two groups: an experimental group and a control group. For three

months, the experimental group learnt about Pakistan Studies utilising CLIL. The intervention featured structured vocabulary lessons as part of the subject matter, which fit with the 4Cs CLIL framework: Content, Communication, Cognition, and Culture. The results showed that the experimental group made a lot of progress in their vocabulary. 43 out of 45 cadets exhibited large advances in their vocabulary knowledge. The results for the group that didn't get the treatment were mixed. We used a custom-made piece of software based on Meara's Lex Test Series to assist us analyse the data and see how much vocabulary students had learnt. Qualitative interviews also showed that English teachers enjoyed how CLIL might get students more interested and help them recall language. However, they underlined how important it was to apply strategies, put things in context, and get students involved. The study's key addition is that it looks at how well CLIL works in a South Asian military education setting, which is a place where there isn't much research on CLIL. The authors have mentioned that there are some concerns, though. For example, the trial was too small, the intervention was too brief, and it has to be utilised in more schools in Pakistan. Longitudinal studies and a larger range of content areas could be added to future study to have a better picture of how CLIL influences language learning.

**Evaluation**

Also, most CLIL studies only focus at improvements in vocabulary, grammar, and understanding, not higher-level language abilities like writing arguments, having critical conversations, or talking to people from other cultures. It is particularly tougher to make generalization because there aren't many long-term studies or cross-curricular CLIL implementations. So, even if CLIL seems like it could work, we need to perform further study utilizing holistic, inquiry-based methodologies to find out how effectively it can help students enhance their English abilities in dynamic, learner-centred environments. These kinds of things will help bridge the gap between research and practice and make CLIL a great way to study language and content at the same time.

### 3.4 Studies related to English Language Acquisition and STEAM (Science, Technology, Engineering, Arts and Mathematics) based learning environment

Jetton et al. (2021) looked at the research on how reading and writing can be employed in STEM/STEAM education in a systematic way. The researchers looked at more than 50 real-world studies from 2005 to 2020 and utilised a qualitative content analysis approach to categorise the types and effectiveness of literacy-based treatments in STEM contexts. The research revealed that the top programs taught argumentative writing, journal reflections, and technical reading through project-based learning. STEM and English Language Arts teachers required to work together across subjects for the initiative to be successful. The authors underlined that mixing reading with STEM courses makes it easier to understand ideas, analyse critically, and talk about things in those domains.

Henriksen et al. (2022) studied how adding the arts to STEM education might assist make learning science more equitable by starting with STEAM. This study, which was not a full experiment, looked at two groups of 258 primary school kids. One group learnt with a "arts-first" STEAM sequence, whereas the other group learnt with a "STEM-first" approach. We conducted assessments before and after to collect numbers on how well students learnt science. We also used instructor observations and conversations with people to add to the analysis. The results showed that kids who learnt STEAM first were considerably more interested in and understood science better. This was especially true for students who were learning English as a second language or who were part of a group that wasn't well represented. It looked like the arts-first order made it easier for all pupils to learn STEM subjects by offering them additional methods to do so. The study proposes that the way courses are set up should be changed such that creative, narrative, or visual tasks are done first. This would help things be more fair and easier to grasp. It was also advised that teachers undergo training on how to plan lessons that cover more than one subject. The research reveals that using an arts-integrated approach is very crucial for making STEM information easier to understand and for helping more students become scientifically literate.

McDaniel (2023) undertook action research in a middle school language arts class to find out how utilising STEAM concepts could aid children with diverse learning needs, especially those who have problems reading. The sample had 42 students, all of whom were between the ages of 12 and 13. A lot of them have Individualised Education Programs (IEPs). For six weeks, students worked on projects that combined ideas from literature with engineering and scientific study. For example, students used digital technologies to produce multimedia stories and came up with inventions based on characters. We gathered information via pre and post-literacy exams, student reflections, and observations of the classroom. The results revealed that pupils were far more motivated, used more vocabulary, and understood what they read better. STEAM's project-based, hands-on approach helped children understand abstract literary themes and allowed pupils who were having trouble reading alternative methods to communicate what they know, including via design and storytelling. McDaniel thinks that schools should incorporate more arts-infused STEAM activities in English language arts classes, especially for students who learn best in different ways. The study adds to the field by illustrating how STEAM may be used to make traditional language arts classes more welcoming and flexible for all kinds of .

### Evaluation

The review of literature as presented above shows that students feel motivated and use far more vocabulary and understand what they read better when exposed to STEAM infused activities. Use of art integrated activities helped students become scientifically more literate and is considered to be very crucial to making STEM information easier.

## 4. Statement of the Problem

The review done from the available relevant literature, relating to the present research area, led the investigators to conceptualize the problem in an attempt to fill the void found.
Thus, the problem is stated as here under:

## 5. Objectives of the Study

The objectives of the present study are:

(i) To prepare a plan of action to teach using Content and Language Integrated Learning in a STEAM based environment for students of standard IX;
(ii) To investigate the possible relationship between the independent variable, classroom climate and the dependent variable, English Language Acquisition;
(iii) To investigate the possible significant difference between the pre-test scores of the independent variable, classroom climate and the dependent variable, English Language Acquisition;
(iv) To investigate the possible significant difference between the pre and post-test scores of English language acquisition among standard IX students in Experimental and Control groups; and
(v) To investigate the possible significant difference between the post-test scores of English language acquisition among standard IX students in Experimental and Control groups.

## 6. Hypotheses

(i) There will be a positive correlation between the independent variables classroom climate and the dependent variable English Language Acquisition.
(ii) There will be no significant difference between the pre and post -test scores of classroom climate and English Language Acquisition in Control Group.
(iii) There will be no significant difference between the pre and post-test scores of English language acquisition among standard IX students in Experimental Group.
(iv) There will be no significant difference between the post-test scores of English language acquisition among standard IX students in Control and Experimental Group.

## 7. Method of Investigation

The present study deals with the analyses of pre and post test scores of the experimental and control groups where the intervention is given to the experimental group for a period of 30 days and traditional method of instruction is given to the controlled group with respect to the independent variable classroom climate and the dependent variable, English Language Acquisition for standard IX students.

### 7.1Population and sample Characteristics

The investigator selected students of Class IX from a government-aided Girls Higher Secondary School, Chennai district for the experimental study (32 students as experimental group and 32 students as control group). The English medium students of standard IX following the Tamil Nadu State board syllabus were selected. For validation of the tools, the investigator selected experts from various field. The experts include teacher educators, Science and English teachers from higher secondary school, teachers from government, aided and unaided sectors, comprise both of male and female experts.

### 7.2 Tools used for study

The variables chosen for the present study necessitated both selection and construction of relevant tools.
The tools selected to be used for assessment of the variables are as follows:

(i) Classroom Climate Scale (The Harvard Graduate School of Education, 2018) Adapted and modified by the researcher.
(ii) English Language Acquisition (Developed by the Investigators)

## 8. Analyses of Data

The result of the analyses of data collected are compiled and presented in the tables below:
Statistical analyses will be based on the hypotheses formulated for the present study. It is predicted to be multivariate statistical analyses as the study includes multiple variables.

**Table-1: Simple Correlation Matrix between Independent variable and English Language Acquisition among Standard IX Students (N=64)**

| Variables | Classroom Climate | English Language Acquisition |
|---|---|---|
| **Classroom Climate** | 1 | 0.32** |
| **English Language Acquisition** | X | X |

****Significant at 0.01 level**

From the above table (Table-1), it is evident that the select variables of the present study, namely classroom climate and English language acquisition are positively correlated with each other and significant at 0.01 level.

**Table-2: Statistical Analysis of Means of Pre-test Scores of Classroom Climate and English Language Acquisition among Standard IX Students in Experimental and Control Groups**

| Variables | Groups | N | Mean | SD | SEM | SED | CR | Level of Significance |
|---|---|---|---|---|---|---|---|---|
| **Classroom Climate** | Control Group | 32 | 36.95 | 6.03 | 1.07 | 1.87 | 0.56 | 0.58$^{NS}$ |
| | Experimental Group | 32 | 38.01 | 8.71 | 1.54 | | | |
| **English Language Acquisition** | Control Group | 32 | 57.50 | 9.88 | 1.75 | 2.66 | 0.26 | 0.79 $^{NS}$ |
| | Experimental Group | 32 | 58.19 | 11.36 | 2.01 | | | |

**NS-Not Significant**

On comparing the pre-test scores of the experimental and control groups of standard IX students it is seen that the pre-test scores of the experimental group and the control group are found to be not significant in both the independent variable namely classroom climate and the dependent variable, English language acquisition. The lack of significant difference indicates that both the experimental and control groups had comparable levels of classroom climate and English Language acquisition before the intervention. This is important as it establishes that any change observed after the intervention can be more confidently attributed to the experimental treatment, not the pre-existing differences.

**Table-3: Statistical Analysis of Means of Pre and Post-test Scores of Classroom Climate and English Language Acquisition among Standard IX Students in Control Group**

| Variables | Pre and Post Test Scores | N | Mean | SD | SEM | SED | CR | Level of Significance |
|---|---|---|---|---|---|---|---|---|
| **Classroom Climate** | Pre-test | 32 | 36.95 | 6.03 | 1.07 | 1.52 | 2.85 | 0.06* |
| | Post-test | 32 | 41.29 | 6.14 | 1.09 | | | |
| **English Language Acquisition** | Pre-test | 32 | 57.50 | 9.88 | 1.75 | 2.64 | 1.16 | 0.25$^{NS}$ |
| | Post-test | 32 | 60.56 | 11.24 | 1.99 | | | |

**NS-Not Significant** ****Significant at 0.01 level**

On comparing the pre- and post-test scores of the experimental and control groups of standard IX students it is seen that the pre-test scores of the control group are found to be significant in the independent variable namely classroom climate and the dependent variable English language acquisition. The lack of significant difference indicates that the control group had comparable levels of classroom climate and English Language acquisition before the intervention.

**Table-4: Statistical Analysis of Means of Pre and Post-test Scores of Classroom Climate and English Language Acquisition among Standard IX Students in Experimental Group**

| Variable | Pre and Post Test Scores | N | Mean | SD | SEM | SED | CR | Level of Significance |
|---|---|---|---|---|---|---|---|---|
| **Classroom Climate** | Pre-test | 32 | 38.01 | 8.71 | 1.54 | 2.12 | 3.13 | 0.96 $^{NS}$ |
| | Post-test | 32 | 44.65 | 8.27 | 1.46 | | | |
| **English Language Acquisition** | Pre-test | 32 | 58.19 | 11.36 | 2.01 | 2.58 | 3.11 | 0.24 $^{NS}$ |
| | Post-test | 32 | 66.19 | 9.12 | 1.61 | | | |

**NS-Not Significant**

On comparing the pre-test scores of the experimental groups of standard IX students it is seen that the mean scores of the experimental group increased from pre-test to post-test, indicating improvement. However, the CR values show that these changes are not statistically significant indicating that the observed gains are not significant within this sample and intervention period.

**Table-5 Statistical Analysis of Means of Post - test Scores of Classroom Climate and English Language Acquisition among Standard IX Students in Control Group and Experimental Groups**

| Variables | Groups | N | Mean | SD | SEM | SED | CR | Level of Significance |
|---|---|---|---|---|---|---|---|---|
| **Classroom Climate** | Control Group | 32 | 41.29 | 6.14 | 1.09 | 1.82 | 1.84 | 0.070 NS |
| | Experimental Group | 32 | 44.65 | 8.27 | 1.46 | | | |
| **English Language Acquisition** | Control Group | 32 | 60.56 | 11.24 | 1.99 | 2.56 | 2.20 | 0.005* |
| | Experimental Group | 32 | 66.19 | 9.12 | 1.61 | | | |

**NS-Not Significant** ***Significant at 0.05 level**

On comparing the post-test scores of the Control group and Experimental groups of standard IX students, it is seen that the mean of post-test scores of the experimental group is found to be higher in both the independent variable classroom climate and also in the dependent variable English language acquisition. It is evident that there is no significant difference between the pre- and post-test scores of classroom climate, while a significant difference is seen in English language acquisition among standard IX students in control and experimental groups.

## 9. Discussion

The present study aimed to examine the Efficacy of Classroom Climate on English Language Acquisition in a Content and Language Integrated STEAM-based Environment among Standard IX Students. The findings from the statistical analyses demonstrate that the intervention which incorporated CLIL strategies within a STEAM framework exerted a positive influence on students' English language acquisition and classroom climate, though the effects varied in magnitude across different variables and comparisons. The pre-test analysis (Table 2) confirmed that the experimental and control groups were comparable in both the independent variable (classroom climate) and the dependent variable (English language acquisition), establishing a sound baseline for assessing post-intervention changes. This supports earlier findings by Fredricks et al. (2004) and Fraser (2012), who emphasized that a positive and interactive classroom climate enhances learner engagement, motivation, and academic performance. The evidence suggests that students who experience supportive, collaborative, and inclusive classroom environments are more likely to demonstrate improvements in English language proficiency, particularly when language learning is integrated with meaningful, hands-on STEAM tasks that contextualize language use.

Furthermore, the post-test comparison between the control and experimental groups (Table-5) substantiates the effectiveness of the intervention. The significant difference ($p < 0.05$) in English language acquisition between groups suggests that the CLIL-STEAM framework successfully outperformed the traditional mode of instruction in promoting language learning. While classroom climate differences were not statistically significant, the trend toward improvement in the experimental group implies that extended or repeated exposure to CLIL-STEAM pedagogy could yield more pronounced effects on affective and social dimensions of learning. Dewey's (1938) theory of experiential learning provides a theoretical basis for this observation, positing that education rooted in experience and interaction promotes both personal and intellectual growth. In this study, students engaged in interdisciplinary tasks that demanded communication, experimentation, and critical reflection-processes that inherently fostered deeper linguistic and cognitive engagement. The alignment of these outcomes with contemporary constructivist and experiential learning frameworks reaffirms that language acquisition flourishes when embedded in purposeful, content-rich experiences rather than isolated linguistic drills.

Future studies could extend the intervention period, diversify instructional contexts, and include qualitative feedback from students and teachers to provide richer insights into the mechanisms underlying the observed improvements. Overall, the discussion reaffirms that CLIL-STEAM environments hold promise for fostering not only linguistic and academic proficiency but also for transforming traditional classrooms into spaces of inquiry, collaboration, and authentic communication — essential pillars for 21st-century education.

## 10. Conclusion

Overall, the data affirm that the intervention produced measurable and statistically significant effects, particularly on English language acquisition. The gains in classroom climate within the experimental group, though not significant in between-group comparisons, suggest that longer or more intensive exposure might yield more robust outcomes. The practical implication is that CLIL-STEAM approaches are not only effective in content and skill development but also in promoting language learning in integrated, real-world contexts.

## References


3. Alharbi, S.H. (2021). The Struggling English Language Learners: Case Studies of English Language Learning Difficulties in EFL Context. English Language Teaching, 14(11), 108–117.
4. Beers, S.Z. (2011). 21st Century Skills: Preparing Students for their Future. National Education Association.
5. Campbell, D.T. and Stanley, J.C. (1963). Experimental and Quasi-experimental Designs for Research. Houghton Mifflin.
6. Classroom Climate Scale. (2018). Harvard Graduate School of Education.
7. Cobb, T. (2007). Computing the Vocabulary Demands of L2 reading. Language Learning and Technology, 11(3), 38–63.
8. Coyle, D., Hood, P. and Marsh, D. (2010). CLIL: Content and Language Integrated Learning. Cambridge University Press.
9. Crystal, D. (2012). English as a Global Language (2nd ed.). Cambridge University Press.
10. Cummins, J. (1979). Cognitive/academic Language Proficiency, Linguistic Interdependence, the Optimum Age Question, and Some Other Matters. *Working Papers on Bilingualism*, *19*, 121–129.
11. Cummins, J. (2008). BICS and CALP: Empirical and Theoretical Status of the Distinction. In B. Street and N.H. Hornberger (Eds.), Encyclopedia of Language and Education (2nd ed., 2, 71–83). Springer.
12. Dewey, J. (1938). Experience and education. Macmillan.
13. Eccles, J.S. and Roeser, R.W. (2011). Schools as Developmental Contexts during Adolescence. Journal of Research on Adolescence, 21(1), 225–241.
14. Eslit, J. D. (2023). Language Learning Adaptations in the Post-Pandemic Classroom: A Qualitative Inquiry. Journal of Language and Education Research, 13(2), 45–59.
15. Fiksl, M., Aberšek, M.K. and Aberšek, B. (2017). The Impact of Innovative Teaching and Learning Methods on the Classroom Climate in Science and Technology Education. Journal of Baltic Science Education, 16(2), 194–204.
16. Fraser, B.J. (2012). Classroom Learning Environments: Retrospect, Context, and Prospect. In B.J. Fraser, K.G. Tobin, and C.J. McRobbie (Eds.), Second International Handbook of Science Education (1191–1239). Springer.
17. Fredricks, J.A., Blumenfeld, P.C. and Paris, A.H. (2004). School engagement: Potential of the Concept, State of the Evidence. Review of Educational Research, 74(1), 59–109.
18. Garnier, M. and Schmitt, N. (2015). The PHaVE list: A Pedagogical List of Phrasal Verbs and their most Frequent Meaning Senses. Language Teaching Research, 19(6), 645–666.
19. Graddol, D. (2010). English next India: The future of English in India. British Council.
20. Henriksen, D., Mehta, R. and Mishra, P. (2022). Arts-based Approaches in STEAM Education: Equity and Engagement through Creative Integration. Journal of Science Education and Technology, 31(1), 15–29.
21. Jetton, T.L., Shanahan, C. and Shanahan, T. (2021). Literacy in STEM/STEAM Education: A Systematic Review of Research. Reading Research Quarterly, 56(1), 75–95.
22. Joulide, G., Rezaei, M., and Bahrami, F. (2020). The Role of Classroom Climate and Self-Determination in Predicting High School Students' Reading Achievement. Journal of Educational Psychology Studies, 17(3), 25–40.
23. Kapoor, R. (2022). Content and Language Integrated Learning (CLIL): An ELT Methodology in the Indian Context. Asian EFL Journal, 24(3), 112–128.
24. Marsh, D. (2012). Content and Language Integrated Learning (CLIL): A Development Trajectory. Córdoba University Press.
25. McDaniel, R. (2023). Integrating STEAM into Middle School Language Arts: Action Research on Diverse Learners. Middle Grades Research Journal, 15(2), 55–72.
26. McQuillan, J. and Krashen, S. (2008). The Case for Narrow Reading. Language Magazine, 7(5), 27–31.
27. Mehisto, P., Marsh, D. and Frigols, M. J. (2008). Uncovering CLIL: Content and Language Integrated Learning in Bilingual and Multilingual Education. Macmillan Education.
28. Memon, A., Qureshi, S. and Khan, R. (2023). Effects of CLIL on EFL Learners' Vocabulary Development in a Pakistani Cadet College. International Journal of English Language Teaching, 11(2), 34–49.
29. Ouazizi, K. (2016). The Effects of CLIL on L2 Students' Content Learning and Language Learning: Evidence from a Belgian Study. English Language Teaching, 9(5), 12–19.

30. Quigley, A., Muijs, D. and Stringer, E. (2019). Metacognition and Self-regulated Learning: Guidance report. Education Endowment Foundation.
31. Schmitt, N. (2014). Size and depth of Vocabulary Knowledge: What the Research shows. Language Learning, 64(4), 913–951.
32. Sheikh, S. (2023). Assessing the Feasibility of CLIL in Indian classrooms: A study of Grades 6 and 7. Indian Journal of Applied Linguistics, 49(1), 85–102.
33. Siyawik, E., Alemayehu, M. and Bekele, A. (2014). Classroom Climate and its relationship with EFL Achievement: Evidence from Ethiopian high schools. Ethiopian Journal of Education and Sciences, 10(1), 23–39.
34. Vygotsky, L.S. (1978). Mind in Society: The Development of Higher Psychological Processes. Harvard University Press.
35. Wang, Y. (2023). A Systematic Review of CLIL in Chinese Higher Education: Opportunities and Challenges. International Journal of Bilingual Education and Bilingualism, 26(2), 145–162.
36. Zhang, L. (2021). Translanguaging Space and Classroom Climate in Chinese EFL Classes: Emotional Expression through Student-made Artefacts. Language, Culture and Curriculum, 34(3), 299–314.