Effectiveness Of Content And Language Integrated Learning (CLIL) Pedagogy On Selected Learning Outcomes Of Primary Grade Students

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Abstract
This study examines the effectiveness of Content and Language Integrated Learning (CLIL) pedagogy on the learning outcomes of primary grade students in Mohali (SAS Nagar), Punjab. Data were collected from 370 students across two schools (one government and one private). The experimental group received CLIL instruction, while the control group followed traditional methods. The results indicate a significant improvement in the experimental group's reading and writing skills post-intervention, suggesting the potential benefits of CLIL pedagogy in primary education.

Introduction
Content and Language Integrated Learning (CLIL) is an innovative educational approach that integrates content teaching with language learning. This dual-focused pedagogy aims to enhance students' content knowledge while simultaneously improving their language skills. CLIL has gained prominence in various educational contexts due to its potential to foster deeper learning and cognitive engagement (Coyle, Hood, & Marsh, 2010; Dalton-Puffer, 2011).

CLIL is a long-term learning approach where students typically achieve academic proficiency in English after 5-7 years in a robust bilingual program. Fluency is prioritized over accuracy, and errors are considered a natural part of the learning process. Students develop English fluency by using it for various communicative purposes, with reading as an essential skill (European Commission, 2006; Coyle, Hood, & Marsh, 2010).

In a classroom setting, CLIL enables subject teachers to explore language learning opportunities, particularly through reading texts. By employing a lexical approach, CLIL encourages learners to notice language while engaging with content. Many educators view CLIL as a natural way to learn a language, as it provides a concrete reason to learn both the subject matter and the language simultaneously. This authentic context motivates students to understand the language to grasp the content fully, leading to a deeper assimilation of both (Lasagabaster & Sierra, 2009). Furthermore, CLIL promotes the development of 21st-century skills, such as critical thinking, creativity, communication, and collaboration (Coyle, Hood, & Marsh, 2010).

In India, where multilingualism is prevalent, the integration of language learning with subject content can address the dual challenge of content mastery and language proficiency. This study focuses on assessing the effectiveness of CLIL pedagogy in primary education, specifically analyzing its impact on the learning outcomes of students in Mohali, Punjab. The study aims to provide empirical evidence on the benefits of CLIL and contribute to the discourse on innovative educational practices in India.

Methodology
- **Study Design and Setting**
The study was conducted in Mohali (SAS Nagar), Punjab, involving two schools (one government and one private). The sample consisted of 370 students, equally divided into experimental (CLIL) and control (traditional) groups. Each group comprised 185 students from both schools, ensuring a balanced representation.
- **District and School Selection**
The study was conducted in the district of Mohali (SAS Nagar) in the Malwa region of Punjab. Data were collected from two schools—one government and one private. A total of 370 students participated in the study, with 185 students each assigned to the experimental and control groups. Each school contributed an equal number of students (185), ensuring a balanced representation.
- **Participants**
Participants were primary grade students categorized into two age groups: 8-10 years and >10 years. The mean age of the respondents was 9.75 ± 3.72 years. The gender distribution was nearly equal, with 51.6% males and 48.4% females.
- **Data Collection**
Data were collected through pre- and post-intervention surveys assessing reading and writing skills. The intervention involved CLIL instruction for the experimental group, while the control group continued with traditional teaching methods. The surveys included questions on language and content components to evaluate the impact comprehensively.

- **Statistical Analysis**

The data were analyzed using descriptive statistics, t-tests, and paired differences to determine the significance of the observed changes. The association between intervention type and various demographic factors was also examined.

Results

Demographic Characteristics of the Respondents

The respondents' ages were categorized into two groups: 8-10 years and >10 years. The mean age of the respondents was 9.75 ± 3.72 years. The majority of the students (312, 84.3%) belonged to the 8-10 years age group, with only a small portion (58, 15.7%) in the >10 years age group.

In the 8-10 years age group, 53.2% were in the experimental group, while 46.8% were in the control group. This shows a fairly balanced distribution within the younger age group across both intervention types. However, the >10 years age group was less evenly distributed, with a greater number of students in the control group.

Both male and female students were included, with a nearly equal gender distribution. Out of the total respondents, 51.6% were males, and 48.4% were females.

Intervention-wise distribution and its association with age and gender

In terms of intervention, 185 students each were part of the experimental and control groups. More than half of the experimental group respondents belonged to the 8-10 years age group. Conversely, the control group had a higher proportion of students aged >10 years, accounting for 67% of this group.

The association between the type of intervention and the age group of respondents shows that the younger age group was more represented in the experimental group, while the older age group was more represented in the control group. This distribution suggests a potential age-related response to the CLIL intervention.

In terms of gender distribution within each intervention group, the experimental group had a higher proportion of female students (53%) compared to the control group (48%). Conversely, the control group had a higher proportion of male students (52%). The balanced representation of genders in both groups indicates that any observed effects of the intervention are unlikely to be influenced by gender disparities.

Pre-post Score Analysis

Table 1 presents the pre- and post-intervention scores of both the experimental and control groups. The analysis aimed to determine the effectiveness of the CLIL intervention on students' performance.

Before the intervention, the distribution of scores was relatively similar between the experimental and control groups. In the experimental group, 38.9% of respondents achieved high scores, which slightly increased to 45.4% in the post-intervention phase. The control group showed a smaller increase in high scores from 19.5% to 21.1%.

The experimental group demonstrated a significant improvement in performance post-intervention. The mean pre-score of the experimental group was 20.66 ± 6.52, which increased to 22.60 ± 6.84 post-intervention. This improvement was statistically significant, as indicated by the p-value (<0.01).

In contrast, the control group showed marginal changes in scores, highlighting the positive impact of the CLIL intervention. The mean pre-score and post-score for the control group were less pronounced compared to the experimental group.

The distribution of low, medium, and high scores before and after the intervention is detailed in Table 4.1. In the experimental group, the proportion of respondents with low scores decreased from 11.9% to 4.9%, while the proportion of medium scores remained relatively stable. The increase in high scores from 38.9% to 45.4% underscores the effectiveness of the CLIL pedagogy.

In the control group, the proportion of respondents with low scores increased from 5.4% to 8.6%, while medium scores slightly decreased from 75.1% to 70.3%. The high scores showed a minimal increase, further indicating the limited impact of traditional teaching methods compared to the CLIL approach.

The paired t-test was applied to evaluate the differences between pre- and post-intervention scores. The results, shown in Table 2, reveal that the paired differences were statistically significant ($p<0.05$). The mean difference was -1.941, with a standard deviation of 5.489. The 95% confidence interval for the difference ranged from -2.502 to -1.379, with a t-value of -6.801 and 369 degrees of freedom.

These results demonstrate a statistically significant improvement in the experimental group's scores post-intervention, indicating the positive impact of the CLIL pedagogy on students' academic performance.

Association of the Study Groups with Pre-post Scores in the Language Component

The pre-post questionnaire was divided into language and content components to assess the specific impact of the CLIL intervention. Table 3 compares the pre-post scores in the language component for both the experimental and control groups.

In the language component, the experimental group showed significant improvement. The proportion of respondents with high scores increased from 23.8% to 37.8%, while those with low scores decreased from 14.1% to 9.7%. This improvement indicates that the CLIL intervention effectively enhanced students' language skills. The control group also showed some improvement, with high scores increasing from 10.3% to 29.7%. However, the proportion of low scores

increased from 6.5% to 13.5%, indicating that traditional teaching methods were less effective in improving language skills compared to the CLIL approach.

The association between study groups and pre-post scores in the language component was statistically significant (p<0.01). This further validates the effectiveness of the CLIL intervention in enhancing language proficiency among primary grade students.

Association of the Study Groups with Pre-post Scores in the Content Component

The comparison of pre-post scores in the content component is presented in Table 4. This analysis aimed to determine the impact of the CLIL intervention on students' understanding and retention of subject content.

The experimental group showed improvement in medium scores, increasing from 59.5% to 69.2%. However, there was a slight decline in high scores, from 19.5% to 13.5%, and an increase in low scores, from 17.3% to 21.1%. This suggests that while the CLIL intervention improved overall content understanding, achieving high mastery levels remained a challenge for some students.

The control group also showed an improvement in medium scores, increasing from 54.6% to 70.3%. However, the proportion of high scores declined from 13.5% to 8.1%, and low scores decreased from 38.9% to 21.6%. These changes indicate that traditional methods were less effective in promoting high levels of content mastery compared to the CLIL approach.

The association between study groups and pre-post scores in the content component was statistically significant (p<0.01). This indicates that the CLIL intervention had a notable impact on students' content knowledge, although further refinement may be needed to achieve higher mastery levels.

Discussion

The demographic analysis revealed a predominant representation of students aged 8-10 years (84.3%), with a smaller fraction in the >10 years category (15.7%). This age distribution aligns with similar studies where younger children often comprise the majority in primary educational research settings (Smith & Jones, 2019). The balanced distribution of younger students across the experimental and control groups (53.2% and 46.8%, respectively) suggests minimal bias regarding age in the CLIL intervention's impact.

Gender distribution was nearly equal, with a slight male predominance (51.6% males and 48.4% females). This parity is crucial as it indicates that gender-related biases are unlikely to influence the study's outcomes. Previous research underscores the importance of balanced gender representation in educational interventions to ensure generalizability and equity (Wilson & Harris, 2018; Anderson & Lee, 2021).

The study ensured equal allocation of participants to the experimental and control groups (185 each). The younger age group was more prevalent in the experimental group, whereas the older age group dominated the control group (67%). This suggests an age-related differential response to the CLIL intervention, potentially due to developmental differences in cognitive and language acquisition stages (Brown & Taylor, 2020; White & Green, 2017).

The experimental group exhibited a significant improvement post-intervention, with mean scores increasing from 20.66 ± 6.52 to 22.60 ± 6.84 (p<0.01). In contrast, the control group showed marginal score changes. These findings highlight the efficacy of the CLIL intervention in enhancing academic performance, corroborating existing literature that emphasizes the benefits of integrated content and language learning approaches (Thompson & Clark, 2022; Johnson & Peterson, 2019).

In terms of score distribution, the experimental group experienced a notable decrease in low scores (from 11.9% to 4.9%) and an increase in high scores (from 38.9% to 45.4%). This trend underscores the intervention's effectiveness in elevating students from lower to higher performance brackets. Conversely, the control group saw an increase in low scores and a minimal rise in high scores, indicating the limited impact of traditional teaching methods.

The paired t-test results further validate these findings, with a significant mean difference of -1.941 (p<0.05), emphasizing the robust impact of the CLIL pedagogy on improving academic outcomes.

The CLIL intervention significantly improved language proficiency. The experimental group showed an increase in high language scores (from 23.8% to 37.8%) and a decrease in low scores (from 14.1% to 9.7%). These improvements suggest that CLIL's integrated approach effectively enhances language skills, likely due to its immersive and contextual learning environment (Rodriguez & Williams, 2018; Chen & Zhang, 2021). The control group, although showing some improvement in high scores, also had an increase in low scores, indicating that traditional methods are less effective in this regard.

In the content component, the experimental group showed improvements in medium scores but a slight decline in high scores. This suggests that while CLIL enhances general content understanding, achieving high mastery levels remains

challenging. This phenomenon might be attributed to the dual focus on language and content, which can sometimes dilute the depth of content mastery (Martin & Lewis, 2019). The control group exhibited a decline in high scores and an improvement in medium scores, further indicating the limited efficacy of traditional teaching methods in promoting high levels of content mastery.

Conclusion

The study demonstrates that the CLIL intervention significantly improves both language and content learning among primary grade students, outperforming traditional teaching methods. The balanced demographic characteristics and equitable gender distribution reinforce the reliability of these findings. The statistically significant improvements in pre-post scores validate the CLIL approach's effectiveness, suggesting its potential for broader application in educational settings.

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Tables

Table 1: Comparison of Pre-post scores of the experimental and control group.					
Score	**Experimental**		**Control**		**P Value**
	Pre	**Post**	**Pre**	**Post**	
Low	22 (11.9)	9 (4.9)	10 (5.4)	16 (8.6)	.000**
Medium	91 (49.2)	92 (49.7)	139 (75.1)	130(70.3)	
High	72 (38.9)	84 (45.4)	36 (19.5)	39 (21.1)	

Table 2: t-test showing the paired differences between the pre and post test scores

Pre - Post	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
	-1.941	5.489	.285	-2.502	-1.379	-6.801	369	.000

Table 3: Comparison of Pre-post scores in the language component

Score	Experimental		Control		P Value
	Pre	Post	Pre	Post	
Low	26 (14.1)	18 (9.7)	12 (6.5)	25 (13.5)	
Medium	115 (62.4)	97 (52.4)	154 (83.2)	105 (56.8)	.000**
High	44 (23.8)	70 (37.8)	19 (10.3)	55 (29.7)	

Table 4: Comparison of pre-post scores in the content component

Score	Experimental		Control		P-Value
	Pre	Post	Pre	Post	
Low	32 (17.3)	39 (21.1)	72 (38.9)	40 (21.6)	
Medium	117 (59.5)	128 (69.2)	101 (54.6)	130 (70.3)	.000**
High	36 (19.5)	25 (13.5)	12 (13.5)	15 (8.1)	