A Comparative Study on AI-Assisted and Traditional Instruction as Teaching Strategy in Vocabulary Acquisition in ELT Classrooms

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Abstract

Vocabulary acquisition is a fundamental aspect of English language learning, and emerging artificial intelligence (AI) tools offer innovative approaches to enhance this process. This comparative study examines the effectiveness of AI-assisted vocabulary learning compared to traditional teaching methods in an English Language Teaching (ELT) classroom, focusing on C1 and C2 level vocabulary retention. An experimental design is employed, involving 100 college-level students, divided into an experimental group (AI-assisted learning) and a control group (traditional instruction). Pre- and post-surveys conducted via Google Forms to assess the vocabulary acquisition levels. The collected data is analyzed using statistical measures with graphical representations illustrating key findings. The findings revealed a significant improvement in vocabulary acquisition among students exposed to AI-assisted learning, suggesting its potential for enriching language instruction and learner engagement. The paper concludes with implications for curriculum design and recommendations for hybrid teaching models.

Keywords: *AI-assisted learning, Traditional Instruction, Vocabulary Acquisition, English Language Teaching*.

1. INTRODUCTION

Vocabulary acquisition is a cornerstone of English language learning, significantly influencing learners' communicative competence, reading comprehension, and academic success. In the context of English Language Teaching (ELT), traditional vocabulary instruction has relied heavily on rote memorization, contextual exercises, and teacher-led strategies. While these methods have proven effective to a certain extent, the demands of 21st-century learners have called for more engaging, personalized, and adaptive learning experiences. With the advent of Artificial Intelligence (AI), digital transformation in education has gained momentum, enabling new pedagogical possibilities.AI-powered tools and applications offer real-time feedback, adaptive learning pathways, and autonomy in vocabulary acquisition. Despite the growing use of AI in education, there remains a notable gap in empirical research comparing the effectiveness of AI-assisted vocabulary instruction with conventional teaching methods, particularly in tertiary-level of English as Second Language (ESL) classrooms in non-native English-speaking contexts such as India. This study addresses the effectiveness of AI-assisted vocabulary learning tools, specifically Google Lens, in comparison to traditional methods among 100 engineering students with C1/C2 proficiency.

By employing a comparative experimental design with pre- and post-assessments, this research examines two key questions. The findings aim to provide data-driven insights for educators, policymakers, and instructional designers, facilitating evidence-based decisions in ELT pedagogy. As, AI continues to reshape education, this study contributes to a nuanced understanding of its potential to optimize vocabulary acquisition in diverse learning environments.

2. Literature Review

Gangavarapu (2022) examined the strategic and cognitive contributions of Technology-Enhanced Language Learning (TELL) in second language acquisition. His findings indicate that digital tools shape learners' focus, memory, and goal-setting, making them more autonomous and strategically aware. The study advocates for integrating technology to enhance language learning outcomes by leveraging its impact on mental processing. Woo and Choi (2021) conducted a systematic review of AI applications in second language acquisition between 2017 and 2020. Their work identified Natural Language Processing (NLP) and machine learning tools as instrumental in improving error detection, assessment, and real-time feedback. Significantly, their review emphasized the pedagogical implications and the pressing need for teacher training in the effective deployment of AI tools. Tan, Cheng, and Ling (2025) conducted a comprehensive review of AI's role in teaching and professional development. Their study revealed a research imbalance—while 65% of studies focused on student learning, only 35% explored teacher development. The authors underscored the ethical and technological challenges of integrating AI into education, advocating for more inclusive research that supports both learners and educators. Wang (2024) evaluated an AI-driven English language tutoring system, using Duolingo as a case study. The system's adaptive learning pathways and real-time feedback mechanisms demonstrated substantial improvements in students' grammar and vocabulary retention. Wang's study involved 125 participants and concluded that conversational AI has transformative potential in future instructional designs.

3. Research Gap

AI-based learning tools have gained prominence in language education, research evaluating their effectiveness in advanced vocabulary acquisition, particularly at the C2 level, remains scarce. Most existing studies focus on general vocabulary learning or lower proficiency levels, leaving a gap in understanding AI's potential in facilitating complex lexical acquisition. This study seeks to bridge this gap by conducting a controlled experimental analysis of AI-assisted learning versus traditional vocabulary instruction for the college level students as English as second langugae. With this gap analysis the research objective is put forth as follows.

3.1. Research Objectives

This study aims to compare the effectiveness of AI-assisted vocabulary learning with traditional methods of instruction in the English Language Teaching (ELT) classroom. By integrating artificial intelligence tools into vocabulary instruction, the research seeks to evaluate whether these technologies offer a measurable advantage over conventional teaching practices. To achieve this, students' vocabulary proficiency will be analyzed through pre- and post-assessment scores, enabling a comparative evaluation of learning outcomes between the two instructional approaches. The findings are expected to provide empirical insights into the pedagogical value of AI in enhancing vocabulary acquisition and inform future practices in technology-integrated language education.

3.2. Methodology

A quantitative research approach is adopted to assess vocabulary acquisition levels before and after both instructions. Prior to the pre-test, all participants underwent a standardized English proficiency assessment using the EFSET (English First Standard English Test) platform. This tool provided a CEFR-aligned score (C1/C2) to ensure the language level of both groups. Data collection involves administering structured assessment with 20 vocabulary questionnaires via Google Forms. The study measures students' vocabulary proficiency at the C1 and C2 level through pre-test and post-test assessments. The

study comprises a sample of 100 college-level learners, divided into two groups. The Control Group is of 50 students, are exposed to traditional vocabulary instruction and Experimental Group is of 50 students will be engaged in AI-assisted vocabulary learning. Statistical analysis, including mean calculations, is employed to evaluate learning outcomes across both groups.

3.2.1. Vocabulary List used for the study

A common vocabulary list comprising 20 advanced-level English words (C1 & C2 level) was used for both groups. The words included: *eloquent, persuasive, nuanced, rhetorical, assertive, discern, pragmatic, verbose, discretion, plausible, mellifluous, obfuscate, ineffable, recalcitrant, fastidious, iconoclast, quixotic, trepidation, cacophony, soporific.*

3.2.2. Assessment Techniques involved

The study employs distinct assessment techniques for both control and experimental groups to evaluate the impact of instructional methods on vocabulary acquisition. The control group receives traditional instruction, which includes teacher-led explanations, board-based teaching, and paper-based vocabulary activities. In contrast, the experimental group engages with AI-assisted learning through the use of Google Lens, a tool that enables learners to scan written text and instantly access AI-powered definitions, contextual usage examples, and pronunciation guides. This comparison aims to assess how the integration of real-time, interactive AI technology influences vocabulary learning outcomes compared to conventional pedagogical approaches.

3.3. Data Collection and Analysis

The scores of all 100 students proficiency test was represented in pie chart. The Pre and Post score of 50 Controlled group students and 50 experimental group students were recorded and grouped into four levels based on their performance between the range of marks as **0–5**, **6–10**, **11–15** and **16–20**. Descriptive statistical analysis was used to interpret the data, and insights were drawn based on student performance across levels.

4. Results and Discussion

The results of this study will determine whether AI-assisted vocabulary learning significantly improves vocabulary retention and usage compared to traditional methods. The study's findings will contribute to ongoing debates on AI's role in language education and offer practical insights for educators and policymakers. As a comparative pilot study, this research will serve as a foundation for further large-scale investigations into AI's impact on language acquisition. The Data collected was represented in pie for the better understanding of the study.

4.1. Proficiency Test Data and Analysis

Figure.1.represents the Proficiency Test Level of IT (G2) Class. 5% of the students belong to A2 level of proficiency. 8 % of the students belong to B1 level of proficiency. 28% of the students belong to B2 level of proficiency. 48% of the students belong to C1 level of proficiency. 11% of the students belong to C2 level of proficiency. The data reveals that there is no AI level in this class. The majority of the class belongs to C1 Proficiency Level.
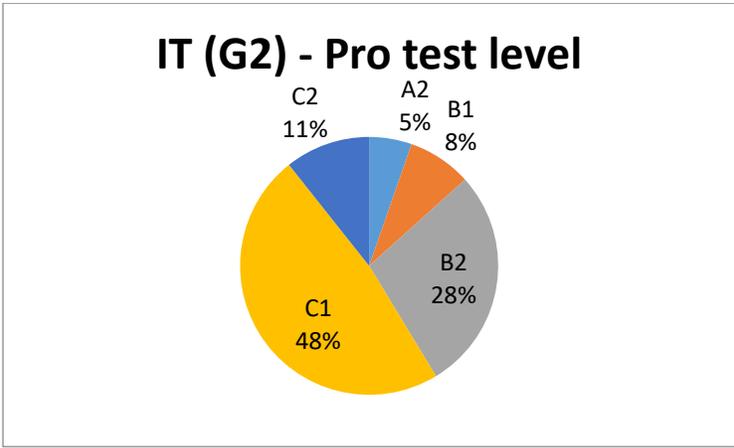
IT (G2) - Pro test level

C2 11% — A2 5% — B1 8% — B2 28% — C1 48%

Figure.1. Proficiency Test Level of IT (G2) Class

Textile Pro Test Level

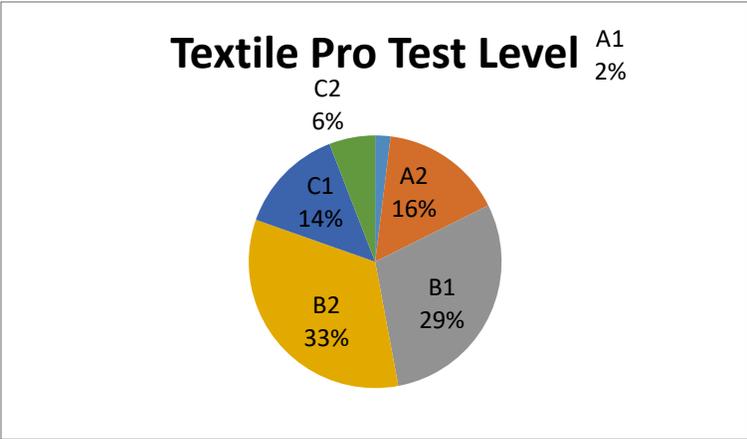A1 2% — C2 6% — A2 16% — C1 14% — B1 29% — B2 33%

Figure.2. Proficiency Test Level of Textile Class

Figure.2. represents the Proficiency Test Level of IT (G2) Class. 2% of the students belong to A1 level of proficiency. 16 % of the students belong to A2 level of proficiency. 29 % of the students belong to B1 level of proficiency. 33 % of the students belong to B2 level of proficiency. 14 % of the students belong to C1 level of proficiency. 6 % of the students belong to C2 level of proficiency. The data reveals that the majority of the class belongs to B2 Proficiency Level.

Proficiency level of Selected Students

A1 1% — C2 9% — A2 9% — B1 17% — B2 30% — C1 34%
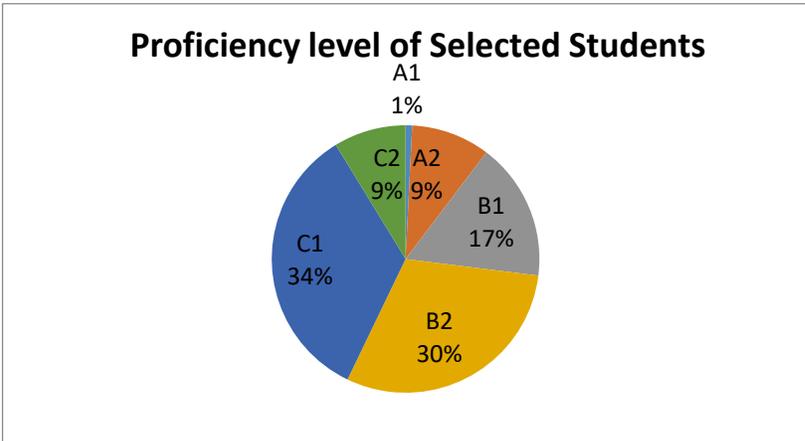
Figure.3. Overall Proficiency Test Level

The overall proficiency level of both classes was represented in Figure.3. 1% of the students belong to A1 level of proficiency. 9 % of the students belong to A2 level of proficiency. 17 % of the students belong to B1 level of proficiency. 30 % of the students belong to B2 level of proficiency. 34 % of the students belong to C1 level of proficiency. 9 % of the students belong to C2 level of proficiency. The data reveals that the majority of the class belongs to C1 Proficiency Level**.**

From the above data analysis, the vocabulary teaching and learning is set to C1 and C2 proficiency level. Teaching and learning employs to develop a new knowledge and upgrade the existing knowledge. So the majority of the class belongs to C1 was considered along with the C2 level. With this backdrop, 20 words ware chosen for the AI assisted learning and for traditional instruction. In that, 10 words belong to C1 level and 10 words belong to C2 level. By setting 20 vocabularies, a Google form test was administered in the class as Pre-Test with the total 100 students. And, the data with pie charts as follows.

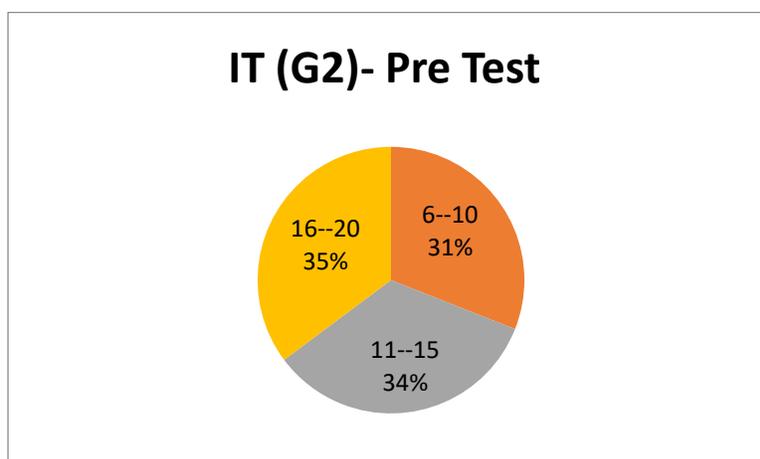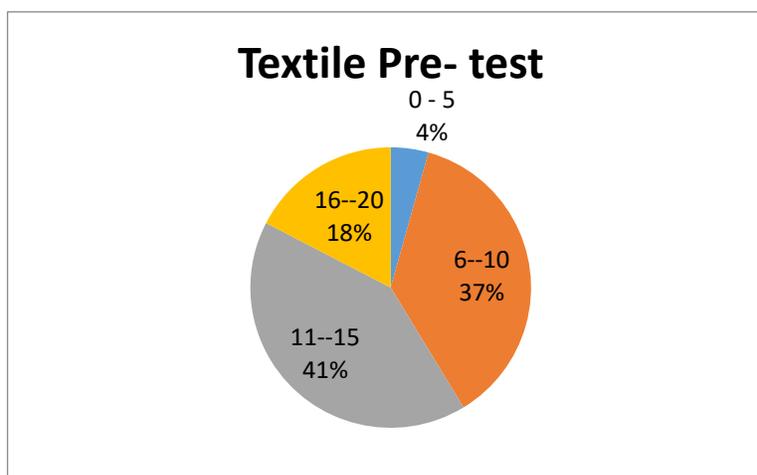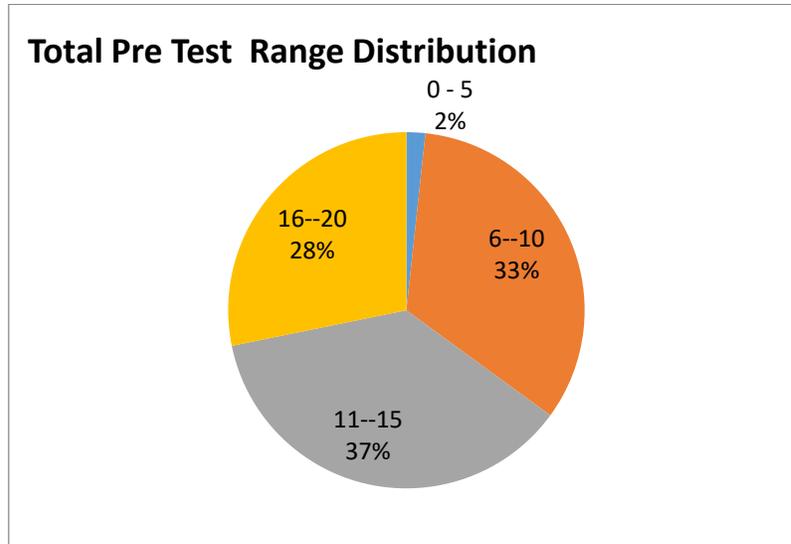**4.2. Pre Test Data and Analysis**

Figure.4. Pre Test Mark Range - IT (G2)

Figure.4. represents the pre test marks of the IT (G2) students. 35% of the students scored 16 to 20 marks. 34% of the students scored 11 to 15 marks. 31% of the students scored 6 to 10 marks. No student scored between 0 to 5 marks.
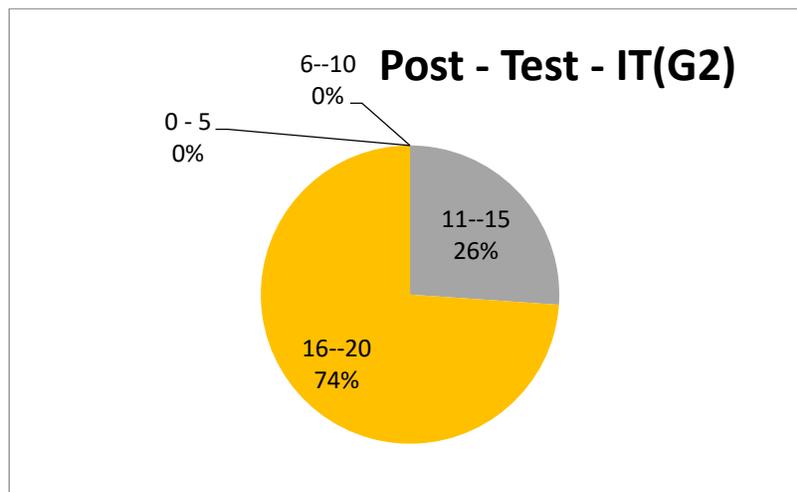
Figure.5. Pre Test Mark Range - Textile

Figure.5. represents the pre test marks of the Textile students. 18% of the students scored 16 to 20 marks. 41% of the students scored 11 to 15 marks. 37% of the students scored 6 to 10 marks. 4% of the students scored 1 to 5 marks.

**Figure.6. Overall Pre Test Mark Range**

The overall pre test level of both classes was represented in Figure.6. 28% of the students scored 16 to 20 marks. 37 % of the students scored 11 to 15 marks. 33% of the students scored 6 to 10 marks. 2 % of the students scored 1 to 5 marks.

4.3. Post Test Data and Analysis

Figure.7. Post Test Mark Range - IT (G2)

Figure.7. represents the post test marks of the IT (G2) students represents controlled group through traditional instruction method. 74% of the students scored 16 to 20 marks. 26% of the students scored 11 to 15 marks. And, there is no student score was between 0-5 and 5- 10. 11 students scored 20 marks.
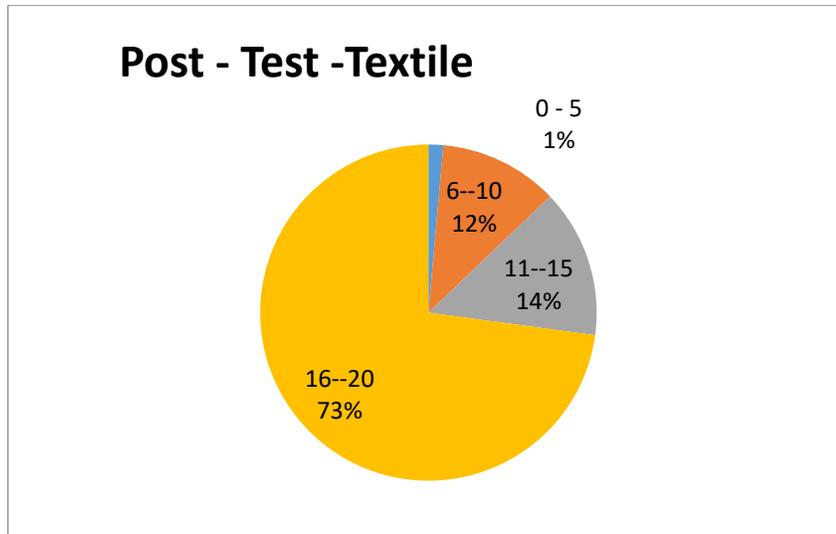
Figure.8. Post Test Mark Range - Textile

Figure.8. represents the post test marks of the Textile students represents experimental group through artificial instruction method. 28% of the students scored the mark range from 16 to 20. 37 % of the students scored between 11 and 15 marks. 33 % of the students scored between 6 and 10 marks. And, there is no student score was between 0-5. 18 students scored full marks.

4.4. Comparative Data and Analysis

The below bar diagram in this section represents the comparative analysis of the AI assisted learning with the traditional instructions of the experimental group students and controlled group students respectively.
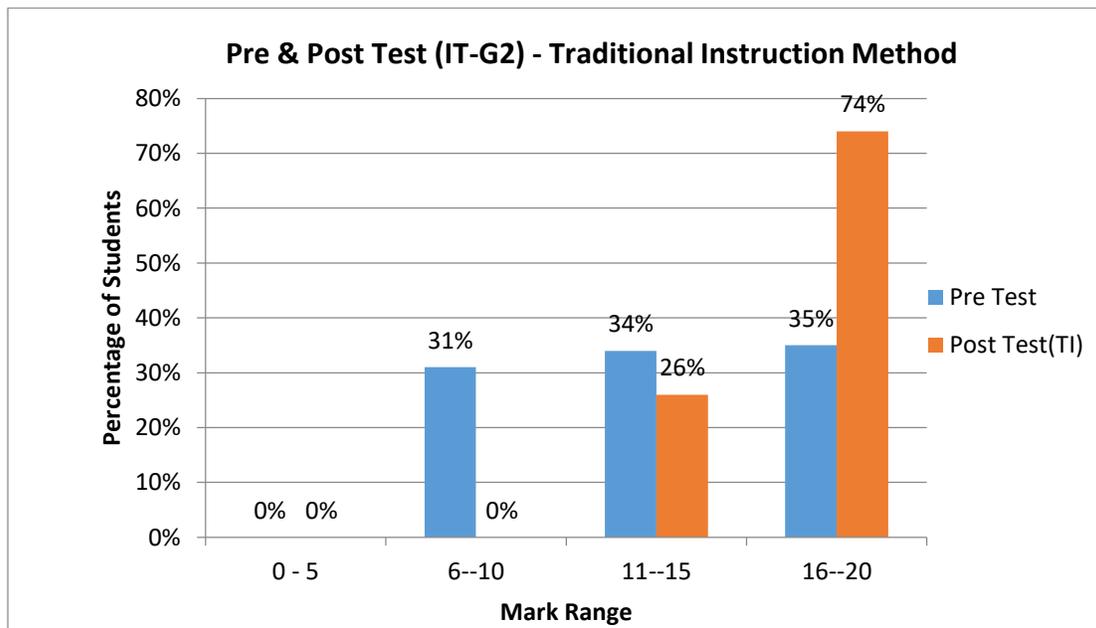

Figure.9. Pre & Post Test – IT (G2) – Controlled group

Figure.9. shows the comparative analysis of the Pre and Post test of the IT(G2) class under Controlled group with Traditional Instruction as the teaching method. There was improvement during the post teaching of the vocabulary. About 74% of students scored under the mark range of 16- 20. But, there were only 35% in Pre test. There is no student under the category 0-5. There are about 11 students scored, the maximum 20 marks.
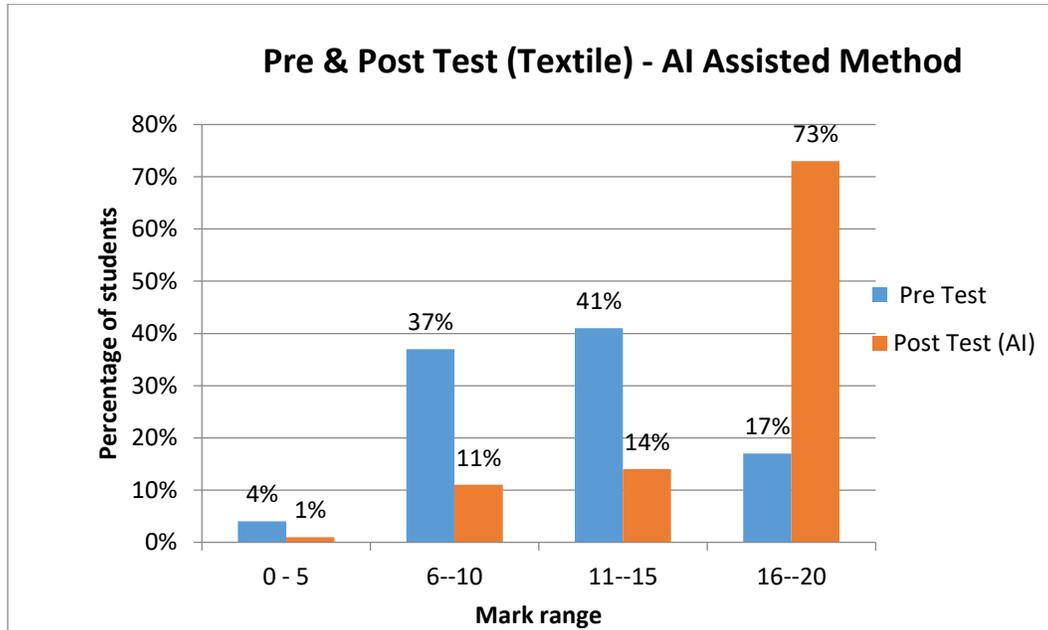
Figure.10. Pre & Post Test – Textile - Controlled Group

Figure.10.shows the comparative analysis of the Pre and Post test of the Textile class under Experimental group with AI assisted teaching method. There was improvement during the post teaching of the vocabulary. About 73% of students scored under the mark range of 16- 20, whereas the there was only 17% during the pre test. But, there were only 1% in Post test under 0-5, when compared to the 4% during the pre test. There are about 18 students scored, the maximum 20 marks.
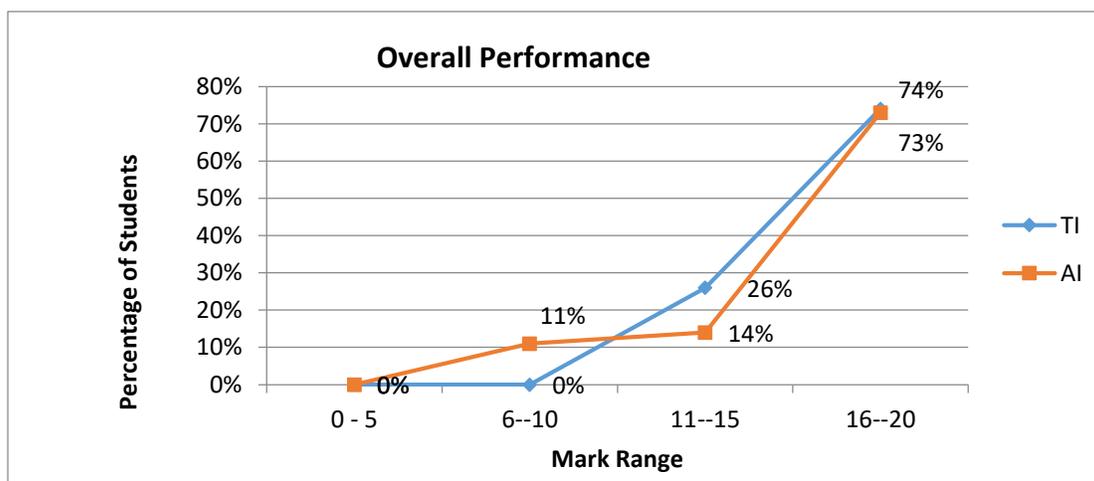
Figure.11. Overall Performance of AI assisted learning (Experimental Group- Textile students) and Traditional instruction learning (Controlled Group- IT (G2) Students)

The line graph, Figure.11. titled "Overall Performance" presents a comparative analysis of student performance across different mark ranges for two groups: TI and AI. It is evident from the graph that both groups performed exceptionally well overall, with a significant concentration of students in the highest mark range of 16–20. Specifically, 74% of students in the TI group and 73% in the AI group fall within this top-performing category, indicating a strong level of achievement across both groups.

Interestingly, while none of the students in either group scored in the lowest range of 0–5, a noticeable difference appears in the 6–10 mark range, where 11% of AI students are represented compared to 0% in the TI group. This suggests that a small portion of AI students struggled slightly more than their TI counterparts. In the mid-range of 11–15 marks, the TI group outperformed the AI group, with 26% of TI students falling into this category versus only 14% from the AI group.

Overall, the TI group exhibits a more focused distribution of high scores, while the AI group shows a slightly more varied performance. That is, 18 students scored Maximum 20 marks in AI category and 11students under TI category. Despite these minor variations, both groups demonstrated commendable academic achievement, with the majority of students performing within the top mark bracket.

5. Conclusion and recommendations

5. 1. Conclusion

The results affirm that AI-assisted vocabulary learning significantly outperforms traditional methods in enhancing C1 and C2 level vocabulary acquisition. Through free tools like Google Lens, learners benefit from context-driven, real-time language inputs, contributing to improved language proficiency. Therefore, AI-assisted instruction fosters more effective vocabulary acquisition than traditional methods. Furthermore, real-time feedback and error correction mechanisms accelerate learning cycles, which is evident in the superior performance of the experimental group. These findings underscore the importance of integrating AI tools into curriculum planning. However, challenges such as unequal access to technology, limited teacher training, and data privacy must be addressed. Additionally, the ethical and infrastructural concerns surrounding AI implementation, urging institutions to balance innovation with preparedness.

5.2. Recommendations

Based on the findings, the following recommendations are proposed:

- **Curriculum Integration:** ELT curricula should incorporate AI tools as supplementary resources to reinforce vocabulary learning.

- **Teacher Training:** Workshops should be conducted to enhance teacher preparedness in using AI tools.

- **Hybrid Instructional Models:** Institutions should develop hybrid models combining AI and traditional methods to cater to diverse learning preferences.

- **Institutional Support:** Infrastructure requirements pertaining to the accessibility of internet and devise.

- **Future Research:** Further studies should examine long-term retention, learner motivation, and teacher perceptions of AI in ELT contexts.

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