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THE EFFICACY OF PSYCHOLINGUISTIC TECHNIQUES IN ENGLISH LANGUAGE EDUCATION FOR EXACT SCIENCE STUDENTS

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ABSTRACT

This study examines the efficacy of psycholinguistic methods in teaching English to third-year students of Mathematics and Informatics, comparing these methods against traditional language teaching techniques. The research involved 153 students divided into experimental and control groups, with the former employing psycholinguistic strategies tailored to their cognitive profiles and the latter following conventional curricula. Results indicated significant improvements in language proficiency among the experimental group, particularly in comprehension, speaking fluency, and technical vocabulary. Statistical analysis confirmed these findings to be significant, suggesting that psycholinguistic approaches can enhance English education for students in exact sciences. The study concludes with practical recommendations for integrating these methods into curricula and suggestions for future research.

Keywords: psycholinguistic methods, pedagogical technologies, English language teaching, exact sciences, language proficiency, educational strategies, curriculum integration.

Introduction

In the contemporary global landscape, proficiency in English is crucial for students of exact sciences, such as Mathematics and Informatics, who must engage with international research, collaborate across borders, and access a vast repository of scientific literature predominantly available in English. Integrating English language training with psycholinguistic approaches can potentially enhance the learning process by aligning it with the cognitive processes involved in language acquisition. The psycholinguistic approach focuses on understanding how the human mind processes language, thereby providing strategies that can make learning more natural and aligned with the learner's cognitive mechanisms.

The primary aim of this article is to explore and evaluate various psycholinguistic methods in teaching English to students of exact sciences. This evaluation seeks to determine how these methods can be tailored to suit the specific

needs of students in scientific fields, focusing on improving their communication skills in academic and professional contexts. The study investigates the efficacy of different psycholinguistic techniques in facilitating faster and more effective English language acquisition among science students.

English proficiency is not merely a linguistic skill but a gateway to participating in the global scientific community. Students of exact sciences face unique challenges in learning English, often due to their more frequent engagement with quantitative data and structured problem-solving, which differ significantly from the nuanced and interpretative nature of language learning. Addressing these challenges with tailored psycholinguistic methods could significantly impact their academic success and professional advancement. This research highlights the critical intersection of language education and scientific training, emphasizing the need for specialized instructional strategies to meet the particular needs of this student demographic.

Methodology

The study involved third-year undergraduate students from the departments of Mathematics and Informatics at a well-established university. A total of 153 students participated, divided into six groups. Three of these groups, comprising 80 students, served as control groups and received traditional English language instruction. The remaining three groups, consisting of 73 students, were designated as experimental groups and were taught using psycholinguistic methods tailored to their specific learning needs in the sciences.

A variety of tools and materials were employed to facilitate English language learning and to assess its effectiveness:

- **Language Proficiency Tests**: Standardized pre-test and post-test assessments were used to measure improvements in language skills over the study period.
- **Psycholinguistic Activities**: These included problem-solving tasks, language games, and coding exercises designed to integrate English learning with cognitive science principles.
- **Assessments**: Regular quizzes and feedback sessions helped gauge ongoing progress and adjust teaching methods accordingly.

The study spanned a full academic semester. Both the experimental and control groups participated in English classes scheduled twice weekly. The control groups followed a conventional curriculum emphasizing grammar and vocabulary. In contrast, the experimental groups used a curriculum infused with psycholinguistic strategies, which included interactive tasks and exercises designed to mimic natural

language use scenarios relevant to their academic subjects. Data were collected through:

✓ **Observations**: Instructors noted students' engagement and interaction during the sessions.

✓ **Student Feedback**: Surveys were conducted to gather students’ perceptions of the effectiveness of the learning activities.

Data analysis was conducted using both quantitative and qualitative methods:

❖ **Quantitative Analysis**: Statistical tests, such as paired t-tests, were used to compare the pre-test and post-test results within and between the control and experimental groups, to assess significant improvements in language proficiency.

❖ **Qualitative Analysis**: Content analysis of student feedback and observational data helped interpret the behavioral impacts of the psycholinguistic approach and its acceptance among students.

Results

The initial and final assessments of students' language proficiency revealed significant improvements in both control and experimental groups. However, the experimental groups, which utilized psycholinguistic methods, showed markedly greater enhancement in key areas such as language comprehension, speaking fluency, and technical vocabulary related to their fields. The average score improvements in the experimental groups were 25% higher compared to the control groups.

Statistical analysis employing paired t-tests confirmed that the improvements in the experimental groups were statistically significant ($p < 0.05$), indicating that the use of psycholinguistic methods had a positive effect on the English language proficiency of students studying exact sciences. These findings align with research suggesting that tailored language learning strategies can enhance comprehension and retention in specialized academic disciplines [3].

Feedback collected from students in the experimental groups indicated a high level of engagement with the psycholinguistic activities. Many reported that these activities made learning English more relevant and interesting, particularly through the integration of discipline-specific content. Students in these groups also noted a perceived reduction in learning difficulty, attributing this to the practical and interactive nature of the teaching methods. Contrastingly, students in the control groups reported challenges with engagement and relevance, particularly in connecting the language skills to their academic and professional goals [1].

Discussion

The enhanced language proficiency outcomes observed in the experimental groups corroborate the psycholinguistic theory that suggests teaching methods

aligned with natural language processing can facilitate more effective language acquisition [2]. This theory posits that integrating cognitive strategies that mimic the brain's innate language processing capabilities can significantly boost learning efficiency and retention, particularly in adult learners who have pre-existing cognitive schemas from their specialized fields of study.

Traditional language teaching methods often focus on rote memorization and repetitive grammar exercises which may not engage students' underlying cognitive skills or relate directly to their specialized academic and professional needs [4]. In contrast, the psycholinguistic approach in this study incorporated problem-solving and contextual learning strategies that are more engaging and relevant for students in exact sciences. This relevance is likely what led to the higher engagement and effectiveness seen in the experimental groups compared to the control groups, which followed a more conventional curriculum.

While the results are promising, there are several limitations to this study. The sample size, though adequate, was relatively small and confined to one academic institution, which may limit the generalizability of the findings. Additionally, the study spanned only one semester; longer-term studies could provide more insights into the sustained impact of psycholinguistic methods on language learning. Another potential limitation is the subjective nature of student feedback, which might reflect transient attitudes and could be influenced by extrinsic factors such as peer influence or testing environments.

Conclusion

The study provided substantial evidence supporting the effectiveness of psycholinguistic methods in teaching English to students of exact sciences. Key findings indicated that the experimental groups, which employed psycholinguistic strategies, showed significantly greater improvements in English proficiency compared to the control groups. This was particularly evident in their enhanced comprehension, speaking fluency, and acquisition of technical vocabulary. These results underscore the potential of aligning teaching methods with cognitive linguistic theories to optimize language learning in specialized academic contexts.

The positive outcomes of this study suggest several practical applications in academic settings:

a) curriculum design: Educational institutions can integrate psycholinguistic approaches into language curriculums for science students, emphasizing problem-solving and interactive learning tailored to their specific cognitive styles and professional needs.

b) teacher training: There is a clear indication for the need to train language instructors in psycholinguistic methods, enabling them to effectively address the unique challenges faced by science students in language learning.

c) resource allocation: Schools and universities should consider allocating more resources towards developing and implementing language learning programs that incorporate cognitive and psycholinguistic strategies, as these have been shown to improve engagement and learning outcomes.

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