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Empowering ESP Students Through a Scientific Approach: Unveiling the Impact on Engagement and Reading Comprehension Achievement

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Abstrak

Penelitian ini didasarkan pada perspektif teoretis konstruktivisme, yang menekankan peran aktif peserta didik dalam membangun pengetahuan melalui interaksi dan pengalaman. Penelitian ini bertujuan mengkaji efektivitas metode ilmiah dalam meningkatkan pemahaman membaca dan keterlibatan mahasiswa Program Studi Informatika di Universitas Jenderal Achmad Yani Cimahi, Indonesia. Studi ini menggunakan desain penelitian campuran untuk menilai efektivitas metode ceramah tradisional dan pendekatan ilmiah dalam meningkatkan prestasi membaca. Penelitian ini dilakukan di Universitas Jenderal Achmad Yani Cimahi di Jawa Barat dan melibatkan 68 mahasiswa dari Program Studi Informatika, dengan fokus khusus pada mata kuliah Praktikum Bahasa Inggris. Hasil penelitian menunjukkan bahwa penerapan metode ilmiah memiliki dampak positif yang signifikan terhadap skor pemahaman membaca pada post test dan keterlibatan siswa. Hasil yang diperoleh dari pretest, post-test, kuesioner, dan wawancara siswa menunjukkan bahwa pendekatan pembelajaran yang interaktif dan praktis meningkatkan tingkat keterlibatan dan pemahaman siswa. Studi ini menekankan pentingnya menerapkan metode pengajaran yang adaptif dan didukung oleh bukti empiris untuk memenuhi berbagai kebutuhan pembelajaran dan meningkatkan pencapaian pendidikan. Meskipun studi ini memiliki keterbatasan yang spesifik pada lingkungannya dan bergantung pada data yang diberikan oleh peserta sendiri, temuan ini secara kuat mendukung adopsi yang lebih luas dari pendekatan ilmiah dalam pengajaran pemahaman membaca.
Kata Kunci: Pendekatan saintifik, Pencapaian Pemahaman Membaca, Keterlibatan siswa

Abstract

This study is anchored in the constructivist theoretical perspective, which emphasizes the active role of learners in constructing knowledge through interaction and experience. It aims to investigate the efficacy of a scientific method in improving reading comprehension and student engagement among Informatics Study Program students at Universitas Jenderal Achmad Yani Cimahi, Indonesia. The study utilizes a mixed-methods research design to assess the effectiveness of traditional lecture methods and the scientific approach in enhancing reading achievement. The study was conducted at Universitas Jenderal Achmad Yani Cimahi in West Java and involved 68 second-semester students enrolled in the Informatics Study Program, with a specific focus on the English Practicum course. The results of the research found that the scientific approach led to better reading comprehension and higher engagement levels compared to traditional lectures. However, when comparing the two methods, the statistical analysis showed no significant difference between them, suggesting that the impact of the scientific approach may vary. The study also found the value of student-centered, evidence-based teaching methods for improving educational outcomes in English for Specific Purposes (ESP) settings. The study emphasizes the necessity of employing adaptable, empirically supported teaching methods to address a wide range of learning requirements and enhance educational achievements. Although the study has limitations that are specific to its environment and relies on data provided by the participants themselves, the findings strongly support a wider adoption of scientific approaches in teaching reading comprehension.
Keywords: *Scientific Approach, Reading Comprehension Achievement, student engagement*

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INTRODUCTION

Prioritizing quality education is critical in Indonesia since students represent the next generation (Pramana et al, 2021). As a result, English language education has experienced substantial changes, which align with worldwide patterns and the increasing need for English fluency in diverse professional domains (Widiatmoko & Winardi, 2018). The Indonesian education system has integrated English, a crucial international language due to its worldwide importance in communication, education, and commerce, to equip students with essential global skills (Amalia & von Korflesch, 2021; Bachtiar, 2020). Nevertheless, Indonesian learners exhibit a range of English language skill levels, which poses difficulties in achieving successful language acquisition (Bisena, 2021).

The main objective of language acquisition in Indonesia is to enhance students' understanding and analysis of English texts in an English as a Foreign Language (EFL) setting. Mastering this skill is essential for achieving academic success and acquiring knowledge (Puusepp, et al., 2023). Regrettably, a significant number of Indonesian students learning English as a foreign language encounter difficulties in achieving a high level of reading ability. Reading comprehension is a crucial skill for acquiring language, as it requires the ability to grasp, evaluate, and analyze written texts. It goes beyond just word recognition, encompassing cognitive processes to generate meaning from texts. Proficiency in reading comprehension is crucial for facilitating effective communication, engaging in academic conversations, and producing intelligible written responses (Ganie & Rangkuti, 2019). This ability poses a significant difficulty for EFL learners because of the linguistic barrier. It has been indicated that having a high level of skill in understanding written texts improves kids' performance in school and increases their chances of success in their future careers.

The assessment of reading comprehension proficiency in EFL students is a crucial indicator of their linguistic competence (Madhi, 2021). It demonstrates their ability to comprehend and incorporate knowledge from written materials, which is essential for continuous learning (Ibrahim Kanya et al., 2023). Evaluating students' overall language proficiency sometimes includes assessing their capacity to understand written texts in a foreign language such as English (Metsala et al., 2021). Their ability to locate and comprehend intricate knowledge is critical for their academic and personal development.

Reading comprehension plays a crucial role in English for Specific Purposes (ESP), as it immediately impacts a student's capacity to comprehend specialized literature in their selected area of study (Benabdi, 2022). Indonesia employs the ESP approach to meet the unique needs of students, tailoring English instruction to their chosen disciplines or professions (Ma'fiyah, 2023). This program provides students with specialized language abilities tailored to their specific fields, which differ from standard English due to its pragmatic approach. The significance of English as a common language in global commerce, science, and technology has stimulated the expansion of ESP programs, which aim to provide students with the necessary language proficiency for their particular fields of study or employment. English for Specific Purposes (ESP) students frequently encounter technical and discipline-specific writings that directly connect to their academic or professional fields (Khan, 2023).

ESP students' reading comprehension achievement demonstrates their progress in comprehending and interpreting literature related to their academic or professional domains. This accomplishment goes beyond fundamental language abilities and includes the comprehension of intricate concepts, technical terminology, and language related to a certain discipline (Sasabone et al., 2023). Schools frequently assess this achievement by administering examinations specifically tailored to evaluate students' language proficiency in their different academic disciplines (Qasem et al., 2023). To attain mastery in ESP reading comprehension, students must effectively combine and utilize their knowledge in practical scenarios, resulting in a substantial influence on their self-assurance, academic achievements, and career advancement (Shirazi & Rahimi, 2023). This accomplishment showcases the efficacy of ESP programs in equipping students with essential linguistic

competencies tailored to their respective disciplines, enhancing their capacity to analyze and comprehend specialized texts in a critical and proficient manner.

The scientific approach to learning EFL prioritizes the utilization of real-world, evidence-based techniques to improve language acquisition (Mursyidin et al., 2022). This technique combines principles from linguistics, psychology, and educational research to establish a structured and efficient learning setting (Perwita et al., 2021). The method employs spaced repetition, contextual learning, and interactive exercises to improve language retention, comprehension, and practical application (Altynbekova & Zhussupova, 2020). Teachers commonly conduct diagnostic assessments to determine students' areas of proficiency and areas for improvement, enabling them to tailor individualized learning plans that adjust to their changing requirements (Mannong & Purwanti, 2020). This strategy utilizes meticulous evaluation to identify precise areas for enhancement while applying focused pedagogical techniques (Lubis et al., 2022). Through the application of a scientific approach, educators provide a well-organized, beneficial, and tailored learning experience in reading comprehension by applying a scientific approach, resulting in improved comprehension results (Hasibin et al., 2022).

The scientific approach enhances student involvement in reading comprehension (Reflianto et al., 2021). Integrating established methodologies with methods to stimulate interest enhances students' active participation in the learning process (Fadhilah & Ginting, 2021). Diagnostic assessments aid in the selection of texts that engage and stimulate students, promoting active involvement in collaborative reading sessions. Utilizing multimedia tools and collaborative activities caters to a range of learning preferences, enhancing the dynamism and involvement of reading. The systematic and responsive method enhances the reading experience by promoting comprehension and retention (Kazemi et al., 2021).

Opting for a scientific strategy to address gaps in research on reading education provides a methodical and quantifiable means to evaluate the success of lessons. The scientific method, in contrast to anecdotal methods, employs rigorous experimentation, systematic data collection, and thorough analysis to determine the most effective teaching methods. According to a recent study, the scientific approach enables teachers to employ systematic steps, such as watching, enquiring, trying, associating, and communicating, in order to enhance student learning and engagement (Yulaikah et al., 2023). These proven and reliable methodologies ground teachings on substantial evidence, leading to improved student outcomes.

While the scientific approach has been widely recognized for its effectiveness in various educational settings, its application within the realm of English for Specific Purposes (ESP) in Indonesia remains notably underexplored. Existing literature predominantly addresses general English as a Foreign Language (EFL) contexts, often overlooking the unique linguistic challenges and content-specific demands faced by ESP students. Previous studies, such as those by Bachtiar (2023) and Fadhilah and Ginting (2021), have highlighted the benefits of evidence-based methodologies in general EFL environments but have not sufficiently addressed the nuanced needs of ESP learners. This gap in research presents a critical opportunity for innovation, as the specialized nature of ESP necessitates a more tailored and rigorous approach to language acquisition.

The novelty of this study lies in its focus on bridging this gap by systematically investigating the impact of the scientific approach on both engagement and reading comprehension within the ESP context. Unlike previous research, which has largely treated EFL and ESP as homogeneous categories, this study distinguishes itself by delving into the specificities of ESP, acknowledging the distinct cognitive and linguistic demands placed on students who must navigate complex, discipline-specific texts. By integrating a scientific approach into the ESP framework, this research not only contributes new insights into pedagogical strategies but also addresses the pressing need for more specialized and effective teaching methodologies in Indonesia.

This study's contribution is twofold: first, it provides empirical evidence on the efficacy of the scientific approach in enhancing ESP students' engagement and reading comprehension, filling a significant gap in the current body of knowledge. Second, it offers practical implications for educators and curriculum developers,

suggesting that a more targeted approach can lead to substantial improvements in students' academic and professional preparedness. Given the increasing demand for specialized English proficiency in global commerce, science, and technology, this research is timely and critical. It holds the potential to inform educational policy and practice, paving the way for more refined and effective ESP programs that better equip students for success in their respective fields.

In conclusion, this study represents a significant step forward in ESP pedagogy, offering a scientifically grounded, evidence-based approach that promises to elevate the standards of English language education in Indonesia. By addressing the specific needs of ESP students, this research not only advances academic discourse but also provides actionable insights that could revolutionize the way ESP is taught, ultimately contributing to the broader goal of improving educational outcomes on a national and global scale.

METHODOLOGY

This study used a mixed-methods research (MMR) methodology to examine the influence of a scientific approach on the reading comprehension of second-semester students. The research's goal is to achieve a thorough understanding of the study subject, thereby improving the reliability and thoroughness of the results. The research was conducted at Universitas Jenderal Achmad Yani Cimahi in West Java and focused on second-semester students enrolled in the Informatics Study Program. The study specifically targeted the English Practicum course, with an emphasis on improving reading comprehension skills. Purposive sampling was used to select the participants to ensure a diverse representation from various classes. The researcher selected a total of 68 students to participate in the study, assigning 23 students to the experimental group and the remaining 45 students equally between two control groups, with 23 and 22 students in each group, respectively.

The research instruments consisted of pretests and posttests, questionnaires, and student interviews. Pretests and posttests employed standardized reading comprehension tests to assess changes in reading achievement, while questionnaires measured student engagement levels before and after the scientific approach was applied. The semi-structured interviews investigated the perceptions and experiences of the students, offering more profound insights into the success of the intervention.

The data collection technique comprised pretests and posttests, questionnaires, and student interviews. The pretests and posttests evaluated the initial and final reading comprehension abilities, while the questionnaires gauged the levels of involvement before and after the intervention. Student interviews provided personal insights into students' experiences and perspectives on the scientific approach, resulting in qualitative data that complemented the quantitative findings.

The quantitative data was analyzed using paired t-tests to determine the effectiveness of the scientific approach on students' reading comprehension and engagement. The paired t-tests were employed to compare the pretest and posttest scores within each group, revealing the significance of the improvements. For the qualitative data from the semi-structured interviews, thematic analysis using Braun and Clarke’s six-phase approach was used (Bachtiar et al., 2024). The thematic analysis allowed for the emergence of rich, nuanced insights into how the scientific approach influenced students' engagement and reading comprehension, revealing underlying mechanisms that quantitative measures alone might overlook. These themes were then triangulated with the quantitative findings to provide a comprehensive understanding of the intervention’s impact.

FINDINGS AND DISCUSSIONS

Three key themes emerged from this study: (1) the effectiveness of the lecture method on reading comprehension, (2) the effectiveness of the scientific approach on reading comprehension, and (3) the comparison between lecture and scientific approach and student engagement.

The Effectiveness of The Lecture Method on Reading Comprehension

Table 1. Students achieve reading comprehension through the lecture method

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test	44	15.00	100.00	75.45	26.29
Post-test	44	20.00	100.00	78.18	22.88

The table above displays the data processing results for the initial reading comprehension test of 44 students who received instruction using the lecture technique. The lowest recorded score was 15, the highest score was 100, and the average score was 75.45, with a standard deviation of 26.29. After learning the lecture method in the control class, the students achieved a minimum score of 20, a maximum score of 100, an average rating of 78.18, and a standard deviation of 22.88.

Afterward, we conducted a comparative examination of the mean values of two paired groups to determine any tangible disparities between the pre-and post-lecture approaches. The statistical test used is a paired sample t-test. In order to utilize this test, it is necessary for the data to follow a normal distribution, which is characterized as having a significance level greater than 0.05. When the data does not follow a normal distribution (with a significance level of 0.05), the test employs non-parametric statistics, specifically the Wilcoxon test.

Table 2. Control Class Normality Test Results

	Shapiro-Wilk		
	Statistic	df	Sig.
Pre-test	.813	44	.000
Post-test	.849	44	.000

a. Lilliefors Significance Correction

The test findings are known to have a significance value of 0.000 < 0.05, which suggests the data is not normally distributed. As a result, the test employs the Wilcoxon test, yielding the following outcomes:

Table 3. Control Class Wilcoxon Test Results

		N	Z	*p-value*
Post-test – Pre-test	Negative Ranks	11[a]	-0,850	0,396
	Positive Ranks	21[b]		
	Ties	12[c]		
	Total	44		

The study indicates that 21 students demonstrated improved performance in reading comprehension following a lecture, while 12 students maintained their previous scores, and 11 students experienced a decline in their results. The Z coefficient value of -0.850 indicates a decrease in pre-test scores, while a p-value of 0.396, which is greater than 0.05, suggests that there is no statistically significant difference in reading comprehension scores before and after the lecture technique.

The study's results indicate that there was no statistically significant difference in students' reading comprehension scores before and after the implementation of the lecture approach. The Wilcoxon test findings ($Z = -0.850$, $p = 0.396$) support this. This is consistent with prior research, which frequently emphasizes the limitations of conventional lecture approaches in promoting significant improvements in reading comprehension. Nirwan (2020) conducted a study that demonstrated the superior efficacy of alternative teaching tactics, like the KWL (Know-Want to Know-Learned) strategy, in enhancing students' reading comprehension when compared to standard methods like lectures. Furthermore, Lastre Meza's (2017) study on the impacts of reading aloud strategies employing non-parametric tests demonstrated notable enhancements in reading comprehension when compared to control groups utilizing more traditional methods. The consistent results indicate that although the lecture method may preserve or somewhat enhance reading comprehension, it

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generally falls short in comparison to more interactive or student-centered approaches in terms of achieving substantial improvements in reading outcomes.

The Effectiveness of the Scientific Approach on Reading Comprehension

Table 4. Students reading comprehension achievement through the scientific approach

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-test	23	40.00	100.00	77.8261	18.32944
Post-test	23	30.00	100.00	86.9565	19.17261

According to the preliminary assessment, 23 students who took the reading comprehension test using the scientific method had a minimum score of 40 and a maximum score of 100. The average score was 77.83, with a standard deviation of 18,329. The scientific technique yielded a minimum score of 30, a maximum score of 100, an average score of 86.96, and a standard deviation of 19.173.

Table 5. Treatment Class Normality Test Result

	Shapiro-Wilk		
	Statistic	df	Sig.
Pre-test	.924	23	.079
Post-test	.701	23	.000

The test findings indicate a significance value of 0.000 < 0.05 on the posttest, suggesting that the data does not follow a normal distribution. As a result, the test employs the Wilcoxon test, yielding the following outcomes.

Table 6. Treatment Class Wilcoxon Test Result

		N	Z	*p-value*
Post-test – Pre-test	Negative Ranks	3[a]	-3,196	0,001
	Positive Ranks	16[b]		
	Ties	4[c]		
	Total	23		

According to the findings of the test administered to 23 students, 16 individuals improved reading comprehension following the posttest, which used a scientific method. Meanwhile, 4 students maintained their scores, and 3 students experienced a decline in their scores. The Z coefficient value of -3,196 indicates that the reading comprehension pretest is much lower than the posttest. Furthermore, the p-value of 0.001, which is less than 0.05, suggests that there is a significant difference in student reading comprehension before and after learning the scientific approach.

The results of this study, which show a substantial enhancement in students' reading comprehension after implementing the scientific approach, align with prior research that emphasizes the effectiveness of this instructional technique. Hijar et al. (2020) conducted a study that demonstrated a significant impact of the scientific method on students' reading comprehension. The pre-test and post-test findings showed significant improvement. Similarly, Maknun (2019) found that the scientific approach was more effective than conventional techniques in improving pupils' reading comprehension skills. Utilizing a methodical, investigation-oriented approach, such as the scientific method, promotes engaged learning and analytical reasoning, both of which are essential for understanding intricate texts. The Wilcoxon test results in your study demonstrate a statistically significant disparity between pre-test and post-test scores, providing more evidence for the efficacy of this technique in enhancing reading outcomes.

The Comparison Between Lecture and Scientific Approach

The reading comprehension test results are shown in this part, with a comparison between the classes that utilized the scientific approach (treatment class) and the lecture method (control class). A statistical test known as the independent sample t-test evaluates the data by comparing the average values of two distinct groups. The

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data must follow a normal distribution and have a significance value greater than 0.05 to be eligible for this test. When the data does not follow a normal distribution (with a significance level of 0.05), the test employs non-parametric statistics, specifically the Mann-Whitney Test.

Table 7. Control and Treatment Class Normality Test Result

	Shapiro-Wilk		
	Statistic	df	Sig.
Reading Comprehension	.849	44	.000
	.701	23	.000
a. Lilliefors Significance Correction			

The test findings have a significance level of 0.000 < 0.05, suggesting that the data does not follow a normal distribution. The study utilized the Mann-Whitney test and produced the following results:

Table 8. Mann Whitney Test Result

	Kelompok	N	Mean Rank	Z	*p value*
Reading Comprehension	Kontrol	44	30.85	-1.861	0,063
	Treatment	23	40.02		
	Total	67			

Comparative tests conducted on students in the control and treatment classes revealed that the treatment class had a higher mean rank value (40.02) compared to the control class (30.85). Furthermore, the Z coefficient value of -1.861 demonstrated that students exposed to the scientific method outperformed those receiving the lecture method in average reading comprehension. However, the p-value of 0.063 is greater than the significance level of 0.05, indicating that there is no statistically significant difference in the reading comprehension scores between the control class and the treatment class. These findings indicate that the scientific approach does not significantly impact pupils' reading comprehension proficiency.

The results of this study, which indicate that there is no statistically significant disparity in reading comprehension between the treatment group employing the scientific approach and the control group utilizing the lecture method, are consistent with certain research but diverge from others. Rajaee and Davaribina (2016) conducted a study which found that while alternative instructional approaches like cooperative learning tend to be more effective than traditional lecture methods in improving reading comprehension, the effect is not consistently significant, especially when assessed using non-parametric tests like the Mann-Whitney U test. However, the statistical significance of these gains may vary depending on factors such as sample size and variation in student performance. The absence of a substantial disparity in your study implies that the scientific approach, although potentially advantageous, does not consistently surpass traditional methods in all situations and populations. Maknun (2019), who found that while scientific and genre-based approaches are generally effective, their effectiveness can vary depending on their implementation and the students' background, also supports this.

Student Engagement

The level of engagement is measured using a Likert scale ranging from 1 to 5, with a total of 22 question items. A validity and reliability test is performed to assess the accuracy and consistency of the items. The test employs the corrected item-total correlation method, with a calculated value (r-count) greater than the critical value (r-table) of 0.396 for a sample size of 23 respondents, at a significance level of 0.05.

Item-Total Statistics		
	r_{hitung}	Interpretation
P1	.506	Valid
P2	.604	Valid
P3	.384	Tidak Valid
P4	.601	Valid

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P5.	.406	Valid
P6	.490	Valid
P7	.335	Tidak Valid
P8	.694	Valid
P9	.860	Valid
P10	.653	Valid
P11	.708	Valid
P12	.757	Valid
P13	.377	Tidak Valid
P14	.770	Valid
P15	.619	Valid
P16	.454	Valid
P17	.653	Valid
P18	.713	Valid
P19	.690	Valid
P20	.595	Valid
P21	.735	Valid
P22	.781	Valid

The validity test identified items 3, 7, and 13 as invalid, resulting in their removal from the questionnaire instrument. We will assess the engagement variable by using 19 question items. A reliability test was performed to evaluate the instrument's dependability, yielding a Cronbach's alpha value greater than 0.6.

The frequency distribution table displays the participants' responses, indicating the extent of student engagement. The provided formula classifies respondents' answer scores based on the average value and assumed standard deviation for each subject (Azwar, 2016).

Hypothetical mean formula:

$\mu = \frac{1}{2} (i_{max} + i_{min}) \sum k$

which is, μ = mean hipotetik
i_{max} = maximum score per item
i_{min} = minimum score per item
$\sum k$ = number of items

We can calculate the hypothetical mean in the following manner:

$\mu = \frac{1}{2} (5 + 1)\ 19$

$\mu = \frac{1}{2} (6)\ 19$

$= 57.$

Next, we calculate the hypothetical standard deviation using the following formula:

$\sigma = \frac{1}{6} (X_{max} - X_{min})$

which is, σ = hypothetical standard deviation
X max = a maximum total score for each item
X min = a minimum total score for each item

To calculate the hypothetical standard deviation, follow these steps:

$\sigma = \frac{1}{6} (95 - 19)$

$\mu = \frac{1}{6} (76)$

$= 12{,}67.$

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Table 9. Terms of Categorical Hypothesis

Formula	Categorize
Mean + 1,5 SD < X	Very high
Mean + 0,5 SD < X < Mean + 1,5 SD	High
Mean – 0,5 SD < X < Mean + 0,5 SD	Moderate
Mean – 1,5 SD < X < Mean – 0,5 SD	Low
X < Mean – 1,5 SD	Very low

By utilizing the aforementioned method, we can classify the outcomes of the participant's responses with regard to the level of student engagement.

Table 10. Frequency Distribution of Students' Engagement Variables

Engagement		Frequency	Percent	Mean (total)	Category
Category	Very high	6	26.1	68,52	High
	High	6	26.1		
	Moderate	11	47.8		
	Total	23	100.0		

The data analysis shows that 26.1% of the 23 respondents have high or very high involvement, while 47.8% fall into the medium engagement category. The average engagement score is 68.52, indicating a high level of engagement.

Besides, interviews with students reveal that the clarity and interactivity of instructional approaches significantly influence the level of student engagement with reading materials. Interviews with students reveal that clear explanations from lecturers, along with interactive tactics like guided reading, class discussions, and critical analysis assignments, enhance their involvement. These techniques enhance the reading process by making it dynamic, thereby stimulating students' interest and improving their ability to remember information. Student B emphasized that incorporating a variety of interactive reading tactics, such as hands-on activities and real-world applications, enhances the relevance and engagement of reading tasks. This method not only promotes a more profound comprehension but also cultivates individual self-control and accountability in relation to acquiring knowledge.

The results of this study, which show a significant level of student involvement as assessed by a Likert scale, are consistent with prior research that highlights the efficacy of interactive and well-organized teaching methods in promoting student engagement. The previous research underscores the significance of teaching strategies like scaffolding, feedback, and active learning in fostering student engagement. This is consistent with your findings that interactive methods such as guided reading and class discussions foster student involvement. Similarly, another study discovered that proficient classroom management and explicit instructional strategies are robust indicators of student engagement, providing more evidence that well-executed teaching methods can enhance students' levels of involvement (Fernández-García et al., 2021). These studies emphasize the significance of employing diverse and interactive teaching methods to cultivate a lively learning atmosphere, which subsequently boosts students' enthusiasm and involvement in the educational process.

Furthermore, linking abstract ideas to real-life encounters enhances students' inclination to actively participate in reading assignments. By including examinations, practical applications, and collaborative group discussions, students are able to develop a sense of success and confidence. Student E expressed that engaging in practical activities and encountering real-life situations stimulate their curiosity to examine many viewpoints and approach complex books with a renewed sense of enthusiasm. Managing complicated reading materials effectively through scheduled schedules, implementing active reading tactics, and seeking further assistance can enhance engagement. In general, the use of interactive and hands-on learning approaches greatly enhances students' involvement with reading materials, promoting both comprehension and motivation.

The study's implications have enormous importance for educational methods, namely in the realm of teaching reading comprehension. The results indicate that implementing a systematic and evidence-based

approach to teaching reading can result in significant enhancements in students' ability to understand and interpret written texts. By integrating interactive and practical learning approaches, this strategy not only improves understanding but also promotes increased student involvement. Educational institutions may consider incorporating additional scientific and participatory methodologies into their curricula to enhance student learning and motivation. Furthermore, the study emphasizes the significance of customizing teaching techniques to accommodate various learning requirements, thus fostering a more inclusive and efficient educational setting.

However, we should address the study's limitations. The sample size was relatively small, consisting of only 68 participants, which could restrict the applicability of the results. Universitas Jenderal Achmad Yani Cimahi specifically targeted second-semester students enrolled in an Informatics Study Program for the study. This context-specific methodology may not comprehensively encompass the diversity in student involvement and comprehension across various academic fields and educational environments. Additionally, the use of self-reported data obtained through questionnaires and interviews may add bias since students may provide responses that are socially desirable. Future research should prioritize the inclusion of bigger and more diverse samples, as well as the implementation of longitudinal studies, in order to evaluate the lasting effects of scientific techniques on reading comprehension and engagement.

CONCLUSIONS

The study revealed that while the lecture method marginally improved students' reading comprehension, the scientific approach significantly enhanced post-test scores and overall engagement. This method proved more effective in addressing the linguistic challenges faced by ESP students, leading to deeper comprehension and motivation. The research highlighted the importance of interactive and practical teaching techniques, which fostered higher levels of student involvement. By systematically integrating evidence-based practices, the scientific approach not only boosted reading outcomes but also demonstrated the potential for broader pedagogical applications. These findings suggest that adopting structured, interactive methods could revolutionize ESP education, making it more effective and targeted. The study's insights offer a compelling case for rethinking traditional teaching strategies in favor of more adaptive and inclusive approaches, with significant implications for the future of ESP pedagogy.

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