

**LISTENING NEEDS OF PHYSICS STUDENTS IN ENGLISH-MEDIUM LECTURES: AN
ESP-BASED SURVEY STUDY**

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ABSTRACT

There are considerable academic challenges when it comes to listening comprehension in physics lectures in English (English medium instruction, EMI) for non-native English speakers. In view of this, the present study was designed to investigate listening difficulties of physics students and their desired types of instructional support. Through the application of descriptive survey design, data was obtained using a structured questionnaire from 60 purposively selected students. The questionnaire focuses on figuring out their motivation, listening problems and required assistance. The results showed a clear need for further support, especially through access to recorded lectures, additional language training, and more guided listening activities. Additionally, the data revealed difficulties were usually of a linguistic nature; students did not easily recognize the pronunciation of technical vocabulary or became accustomed to different accents of the lecturers. Even so, many students expressed that they could still follow the main flow of the lessons and remained highly motivated in their studies. Based on the results, there are some ways of overcoming obstacles related to listening in EMI physics courses based on the students' perspective. Regular practice of pronunciation, more exposure to different English accents, and easy access to review materials are needed to improve listening skills and academic performance of students.

keywords: Academic English; Listening Difficulties; Physics Classroom Context; Comprehension Barriers; Language Proficiency.

INTRODUCTION

Background of the problem

Physics lectures delivered through EMI are linguistically challenging to many students whose first language is not English. The most difficult skill needed for processing and understanding the content of a lecture is listening. Students often complain about the difficulties stemming from the rapid pace at which a lecturer speaks, the unfamiliar intonation, and difficulties in decoding technical physics vocabulary quickly during the delivery. Successfully navigating an EMI requires lecturers to have mastery of English, thereby challenging the students to improve their mastery of English and their listening acuity (Zumor, 2019).

In academic settings, listening is a demanding activity. To the end, Flowerdew and Peacock (2001) state that students need to listen for the structure of the lecture, the transitions as well as the organizational patterns of the explanations, the examples and the summarizations in academic listening. Field (2008) adds that listening comprehension becomes more difficult when the speech rate is high, pronunciation is unfamiliar, or technical terms appear in rapid succession. In scientific lectures, these issues are amplified because physics contains dense conceptual language and terminology.

Obstacles for students who comprehend EMI lectures are not only linguistic (such as complexity of the terminology and pronunciation), but also cognitive (such as the cognitive load) and affective (such as self-confidence and anxiety in listening) (Situmorang & Pramusita, 2024).

Several students also mentioned the need for clearer support, including recorded lectures and language assistance. This feedback shows that the current support system is still not fully aligned with what students actually need. For this reason, exploring the listening challenges they face and identifying forms of support that could help them participate more confidently in EMI physics lectures becomes necessary.

Literature Review and Research Gap

Previous study on ESP Needs Analysis

Research on the field of ESP consistently highlights the importance of conducting needs analysis as a foundation for developing appropriate language learning programs. One study relevant to this topic was carried out by prayogo (2016), who investigated the linguistic needs of physics students through a survey based approach. The results were quite interesting: students considered presentation skills to be the most important academic need, while note-taking during lectures was considered less important. For general English language needs, they placed greater emphasis on listening activities such as songs or the radio. These findings provide an initial glimpse into what students perceive their needs, although they are still quite general in nature.

Research Gap identification

Prayogo's (2016) study offers an early perspective on students' language needs in the ESP context. These findings indicate that students have different needs in terms of academic language skills in the EMI context of physics learning. At the same time, some research in other STEM settings report that lectures' speaking rate, accent and the degree of use of jargon in explanations of content may affect listening challenges. However, these findings are fragmented and do not specifically address physics students' experiences processing mathematical, symbolic, and abstract reasoning language delivered verbally in class.

Therefore, it can be concluded that there is still a gap in the literature: there is a lack of research explicitly investigating physics students' listening challenges in EMI lectures and the types of support they consider effective. Therefore, this study was conducted to fill this gap by specifically highlighting listening difficulties that arise in the context of EMI-based physics learning, while also identifying types to support students' need to optimally understand the material.

Research Objectives and Questions

In view of the above, this study will thus conduct a focused Needs Analysis with Physics students attending lectures in EMI to offer an informed view on the problems stated in the previous

sections. The analysis is useful in that it goes beyond simply identifying problems to earmarking particular problems for addressal. The findings of this review will feed directly into modifications in teaching and materials in the EMI program to provide targeted support in particular, this study has the following objectives:

1. The particular listening problems which the students encounter, especially in the highly technical aspects of the lecture, such as pronunciation of specialized terms, articulation of mathematical symbols, and variability of international accents in Physics lectures.
2. Identify which types of pedagogy and learning resources are best suited to the needs of the students to facilitate their learning of the Physics content when taught by the English-medium

Research Questions

To this end, this study raises the following questions:

1. What are the particular listening problems faced by students taking Physics in English?
2. What kinds of learning support and resources would best help students to overcome understanding barriers in EMI Physics courses?

Methodology Overview

The present study utilizes a quantitative descriptive survey design in order to conduct a comprehensive needs analysis in Physics classes taught in English. This method was selected based on its efficiency for the collection of measurable data from the population of students in the Physics course regarding their reported difficulties in listening, coping strategies, and resources needs. Data collection is done through a structured questionnaire, designed to maintain consistency with 5 point likert scales.

The instrument is divided into several analytic parts-including sections on student motivation, listening strategies, specific difficulties, which would include technical vocabulary barriers and accents, and Needs for Pedagogic Support-providing strong multi-dimensional insight. After retrieval the raw data is analyzed by descriptive statistics, focusing on the calculation of mean and standard deviation. The appropriate identification and prioritization of the most pressing listening challenges and forms of institutional support are enabled through interpretation of the mean values. Hence, such a systematic process forms the empirical foundation required for the development of evidence-based pedagogical recommendations presented in the conclusions of this study.

RESEARCH METHODS

This study utilized a descriptive quantitative survey design to probe into the listening needs of physics students in EMI learning contexts. The descriptive quantitative approach is deemed appropriate because it can reveal patterns, perceptions, and dominant challenges based on measurable responses emanating from a host of participants (Sugiyono, 2013). Quantitative research has the survey method as a common methodology to infer data that can be measured systematically and hence is suitable for the analysis of trends from a large number of respondents (Cohen, Manion, & Morrison, 2018).

This design was selected because it enables the systematic identification of listening difficulties, learning expectations, and support needs among students in EMI physics courses.

Design

The design of this study employed descriptive quantitative research through a survey design. The questionnaire was an efficient design for this study because it allowed data collection regarding the listening needs in EMI lectures by physics students in an orderly and transparent way. By conducting the survey, I could gain a comprehensive picture of what students need in order to understand physics lectures delivered in English. This method was also appropriate because it involved direct data collection from a substantial number of respondents hence it allowed the determination of common patterns in their needs. Zhou & Rose longitudinal study (2024) underlined that students frequently struggled to follow EMI lectures due to technical terminologies and fast speech of lecturers. Quantitative data obtained in this research are thus expected to provide a clear, objective description of physics students' listening needs in the context of EMI, which can serve as a basis for developing more appropriate learning materials and instructional strategies. The use of survey based needs analysis is also in agreement with Hutchinson & Waters (1987) and Long (2005),

who highlight the importance of systematic and structured data collection in order to identify the target needs of learners appropriately.

This research was conducted with 60 students who had already taken lessons in physics and English. The participants were engaged students in the physics program at the institution. In this sample, there was a broad representation of different academic backgrounds and English proficiency levels.

In this study, data collection was conducted using a closed-ended questionnaire distributed online. This type of questionnaire was chosen to ensure that participants' responses could be recorded in a structured and easily measured manner, allowing for more accurate and systematic descriptive statistical analysis.

Selection process

Purposive sampling (students who attended physics lectures in English) The methods created ensured only participants with direct experience with English courses were included in the study. Purposive sampling makes a difference here because it brings in voices that actually matter. The study talks to students who've sat through physics lectures in English, so you get firsthand stories from people facing language barriers all the time.

Research Instruments

The method of data collection was completed with the use of a questionnaire with personal data. In this study, a questionnaire was designed based on a five-point Likert scale which was used to identify the level of listening difficulty. The questionnaire in this study consists of 40 questions which are arranged based on aspects of clarity of pronunciation, understanding technical vocabulary, and speed of delivery. Cohen, Manion, and Morrison (2018) note that purposive sampling is well suited, as it focuses on individuals whose backgrounds and experiences are directly relevant to the research aims.

Data Collection Procedure

The data collection procedure was done in the individual location of the respondents. The questionnaire was forwarded directly by distributing a link through social media. The questionnaire could be held at a certain time. The full data gathering was completed at each respondent with us at their own location via the internet, and was efficient and suitable for the inquiry situation. Convenient links to the survey were distributed on social media, allowing participants not only from various locations to access the setup but also to complete the questionnaire at their leisure. This approach achieved a good balance between accessibility to a large number of potential participants and maintaining the level of participation and comfort of respondents, which ensured that the data collected sufficed the research aim.

Research design

The research design chosen is quantitative descriptive research with a questionnaire survey approach and filled in by respondents. This design was chosen based on its suitability to comprehensively describe the listening needs of physics students in English language lectures.

We use this method because the quantitative approach really lets us capture the full scope of what's going on. Surveys work well here they reach plenty of people quickly without wasting time. Plus, when we gather all that data, we can run solid statistical analyses and end up with results we can trust.

Research instrument

We used a closed-ended questionnaire with a 1-5 Likert scale as our main tool. First, we made sure every question matched our research goals. Then we asked a few experts to check the questionnaire so we could be confident it actually measured what we wanted. As highlighted by Brown (2009) and by Cohen, Manion, and Morrison (2018), Likert scales provide an effective way to capture respondents' perceptions in a format that can be clearly organized and analyzed numerically.

The questionnaire itself had a few parts, each focusing on something different. The first part looked at how much trouble students have understanding what they hear, Field (2008) and Rost (2011) point out that challenges in listening comprehension commonly arise from elements like rapid speech, unfamiliar accents, and the cognitive demands involved in interpreting spoken input.

Then, we inquired about student interaction with content in their courses. This section drew on the work of Jordan (1997), Swales (1990) and Flowerdew & Peacock (2001), which emphasize that students comprehend lecture content (1) through the act of reorganizing their notes, (2) by identifying discourse markers and (3) through contextual information that acts as a cognitive map.

At the end, we wanted to know what students hope for and expect when it comes to building their listening skills.

Data Analysis

The analyzed data from the collected questionnaires were analyzed from a descriptive statistical method. The analysis involved in the questionnaires was carried out by calculating the percentages, frequencies, and average score for each questionnaire item. The analyzed data then was analyzed again to make sense of the identified patterns of trends or needs.

RESULTS AND DISCUSSION

Results

Data analysis of 60 Physics students indicates a high level of listening needs during English-language lectures. Overall, it emerged that students face considerable linguistic barriers. In detail, the most frequent problems are the different accents in lectures and the speed at which verbal mathematical terms are processed. This situation made students feel the need for additional support to better understand the lecture content. This is reflected in the high demand for lecture recordings, guided listening exercises, and enrichment courses, which ranked highest in this survey.

Table 1. Level of Listening Needs by Category

Analysis Category	Mean	Level	Description
Listening Purpose	4.17	High	Motivation and reasons for listening to physics lectures in English lectures
Structure Comprehension	4.20	High	Ability to comprehend lecture organization and flow
Technical Term Comprehension	3.65	Medium	Ability to grasp and understand particular physics terminologies
Academic Content Comprehension	3.93	High	Ability to understand Physics concepts
Listening Strategies	3.84	High	Comprehension strategies employed
Listening Difficulties	3.42	Medium High	Obstacle faced and perception
Motivation and Perception	3.92	High	Attitudes and motivation toward EMI
Learning Support Needs	4.21	Very High	Facilities and aids that the students require

As it can be seen from Table 1, the mean score for each category indicates that the overall listening needs of physics students are high. The highest mean was obtained for the learning support needs category with a score of $M = 4.21$. Indicating that extra support is particularly needed in lecture recordings, supplementary programs and guided listening sessions. In contrast, the technical term comprehension category recorded the lowest mean of $M = 3.65$, indicating a problem in understanding technical terms used in physics and the mathematical language in English.

Table 2. Highest Scoring Items

Question	Mean	Category	Level
Q37 Needed Lecture Recordings	4.45	Learning Support	Very High
Q5 Familiar with Technical Terms	4.38	Listening Purpose	Very High
Q35 Interested in Taking More Courses	4.32	Learning Support	Very High
Q36 Need Listening Practice in Class	4.28	Learning Support	Very High
Q4 Information for Assignments Exams	4.28	Listening Support	Very High

As indicated by Table 2, items with the highest mean scores focus on students preference for structured and accessible learning support. The highest score (M = 4.45) for lecture recordings indicates the strongest need for flexible learning aids that can help students review and comprehend material. Similarly high values for additional courses and in-class practice reflect students' desire to be constantly exposed to EMI listening contexts.

Table 3. Lowest Scoring Items (Problem Areas)

Question	Mean	Category	Level
Q13 Difficulty With Different Pronouncement	3.28	Terminology Understanding	Low
Q27 Difficulty With Certain Accents	3.32	Listening Difficulties	Low
Q28 Problem With Complex Mathematics Terms	3.38	Listening Difficulties	Low
Q26 Difficulty Due to Fast Speech	3.42	Listening Difficulties	Medium
Q29 Stop Paying Attention to Abstractions	3.42	Listening Difficulties	Medium

Table 3 lists the most challenging features of listening, including pronunciation, accent, and mathematical terms. The low mean scores indicate that students were confused by unfamiliar pronunciation and could not identify words or phrases due to rapid speech. This often happens in EMI class settings as non native students get used to different accent patterns.

Table 4. Priority Needs and Difficulties

Type	Item	Mean	Recommendation
Greatest Difficulty	Pronunciation of Technical Terms (Q13)	3.28	Pronunciation Drilling
Greatest Difficulty	Accent Difficulty (Q27)	3.32	Exposure to Varied Accents
Greatest Difficulty	Complex Math Terms (Q28)	3.38	Mathematical Scaffolding
Priority Need	Lecture Recordings (Q37)	4.45	Provide Lecture Recordings
Priority Need	Additional Courses (Q35)	4.32	Special Programs
Priority Need	In Class Practice (Q36)	4.28	Curriculum Integration

Table 4 emphasizes two key areas of pedagogical development: linguistic support, which involves pronunciation and accent comprehension with focused training and instructional support; and instructional support, which offers lecture recordings and extra practice sessions as essential elements for improving listening.

Table 5. Mean Distribution by Analysis Category

Category	Mean	Level	Interpretation
Learning Support Needs	4.21	Very High	Very Urgent Needs
Lecture Structure Comprehension	4.20	High	Good Ability Should Be Maintained
Listening Purpose	4.17	High	Clear Motivation and Purpose
Understanding Academic Content	3.93	High	Fairly Good Understanding
Motivation and Perception	3,92	High	Strong Motivation; However, Needs More Confidence
Listening Strategies	3.84	High	Strategies Already Applied
Technical Term Comprehension	3.65	Medium	Needs Special Attention
Listening Difficulties	3.42	Medium High	Obstacles Should Be Addressed

As illustrated in Table 5, most categories received high mean scores, which indicate that students are motivated and able to follow EMI lectures effectively. However, specific categories such as Technical Term Comprehension and Listening Difficulties remain low, indicating that vocabulary improvement and targeted support for comprehension are in order.

Table 6. Suggested Actions Derived

Aspect	Mean	Recommendation
Support Needs	4.21	Application Immediate
Structure & Organization	4.20	Optimizing and Maintaining
Motivation & Purpose	4.17	Use as a Development Foundation
Academic Content	3.93	Improve with Concrete Examples
Learning Strategies	3.84	Teach Explicitly
Technical Terms	3.65	Focus on Vocabulary Building
Difficulties	3.42	Apply Specific Interventions

Lastly, Table 6 summarizes the developmental implications of the research findings, indicating that learning support is the area most in need and that teaching strategies should be channeled toward explicit instruction, with vocabulary development using concrete examples consistently used to enhance students' comprehension in physics further.

Discussion

Data collected indicate that the physics students learning through EMI need more intensive learning support in lecture recordings and supplementary classes. This is evidenced by the highest score in learning support (M = 4.21) requirement of lecture recordings (M = 4.45) or guided listening practice. This accords with the results reported by Flowerdew and Miller (2015) according to which second language learners require more oral exposure in order to be able to comprehend the texts satisfactorily. This problem arises in physics lecture as further heightened by the complexity of academic English and the frequency of terms used only in science writing. It is through this additional support that students gradually learn to rise to the demands of academic language.

The biggest obstacle to listening is students' inability to understand technical terms and the lecturer's accent. This is evident from the lowest scores on the items pronouncing technical terms (M = 3.28), understanding the lecturer's accent (M = 3.32), and Language listening comprehension (word recognition). According to this, there is a significant barrier in the physics course. Low scores in the Technical Term Comprehension category (M = 3.65) also indicate that, despite students' high motivation to learn, they still cannot understand the terms pivotal to understanding the physics course.

High motivation of students was reported with a mean category of (M = 3.92), but combined with low self-confidence, it points to an imbalance in the affective domain of EMI learning. This corresponds to Kim's (2020) findings that emotional factors are of much greater significance for

successful second-language acquisition. Even though students are aware of the value of English for their future academic and job opportunities, classroom conditions can create stress, heightening anxiety and uncertainty. According to Krashen's affective filter hypothesis, negative feelings impede language input and reduce the efficiency of learning.

Moreover, students appear to be good at identifying lecture structure, as the mean in the structure comprehension category is high ($M = 4.20$), reflecting positive metacognitive awareness and further supporting the contention of Vandergrift and Goh (2012) regarding the value of metacognitive strategies in second-language listening skills. On the other hand, however, this research showed that structural awareness was not strong enough to allow students with weaknesses in vocabulary mastery to handle a lecture. In other words, bottom-up skills related to recognition and meaning processing need to be enhanced for complete comprehension of a lecture.

Students' greater comfort further confirms their preferences for the bilingual learning model over complete EMI using two languages. This is reflected in the relatively high average score on the comfort with bilingual explanations item ($M = 4.0$). These findings also support Al Zumor's (2019) findings, which show that a gradual transition is the most effective way to enhance comprehension processes in science learning. In such a context, conceptual understanding should come to the fore in Physics studies, and therefore, strategic use of the first language can help bridge the gap without reducing exposure to English.

These findings, in their entirety, confirm that, in the case of EMI Physics, listening comprehension is determined by an interaction among linguistic, conceptual, and affective factors; this, in turn, calls for an integrated pedagogical approach in which language competence and scientific knowledge are developed together. A balanced approach will thus be required, combining targeted linguistic scaffolding with strategic use of the L1 for concept clarification and supportiveness in learning resources to ease students into the demands of the English medium academi without compromising depth physics comprehension

CONCLUSIONS

The present study corroborates the finding that physics students in EMI lectures experience considerable listening difficulty, which gives rise to a multifaceted demand for support. The main needs fall into three interrelated categories: (1) Flexible Learning Support, as manifested in high demand for lecture recordings ($M = 4.45$) and guided practice, which is driven by the fast paced and non repeated nature of live lectures, (2) Linguistic & Technical Processing Support due to difficulties related to technical pronunciation ($M = 3.28$), and Mathematical Terms Accents and Affective & Strategies Scaffolding since high motivation ($M = 3.92$) co-occurs with low confidence, The preference noted above arises from the anxiety associated with increasing emotionality and barriers to comprehending meaning. To put it another way, when L2 learners are required to listen to complex technical information at a fast rate and under time pressure, it creates a set of listening demands. Therefore, it is essential to focus on correcting the symptoms rather than addressing the cause through integrated support (i. e. audio glossaries, dedicated listening modules, strategic bilingual scaffolding). Further research is needed to test the effectiveness of these interventions in different contexts using longitudinal studies in order to follow the progress of EMI Physics students' listening skills.

ACKNOWLEDGEMENTS

I want to thank all the people and places that helped finish this research. The author would like to thank the physics participants-reporting students in the English language lectures. The author would also like to thank the lecturers teaching the English for Physics course for their helpful comments and suggestions during research. In addition, the author would like to extend appreciation to the Physics Education Study Program for facilitating this research. It is, therefore, the immediate responsibility of instructors to adopt some of the approaches outlined in this paper in the case of the latter, it is expected that subsequent studies should develop and integrate a unique set of listening strategies for physics, which shall be trialed over a long period to solidify those skills. In general, EMI in Physics is possible only by findings the right balance between linguistic and content-based supports to allow learners to understand and engage with the material thoroughly.

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