

EXPLORING PHYSICS EDUCATION STUDENTS' PERCEPTION TOWARD ESP INSTRUCTION: EVIDENCE FROM A SURVEY STUDY

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ABSTRACT

English for Specific Purposes (ESP) is essential for the academic achievement of physics education students, especially for understanding scientific content and communicating research findings. This study seeks to look at the viewpoints of students in the physics department on English for Specific Purposes (ESP) and to discern the elements influencing their attitudes, motivation, and involvement in ESP instruction. A questionnaire with 50 items was given to 80 physics students as part of a descriptive qualitative approach. The finding indicates that the students demonstrated a general positive perception with an overall mean score of 3.84. A total of 56.87% of respondents had favourable opinions, mostly because of ESP's value in enhancing academic reading and writing as well as understanding scientific vocabulary. Motivation was seen as the most important contributing factor ($M = 4.12$), followed by prior experience with English and instructional methodologies. Students said that contextual and interactive ESP exercises improved their engagement and confidence in employing academic English. According to the study's findings, physics education students believe that ESP is pertinent and helpful for their academic and professional growth. Strong motivation, encouraging learning environments, and context-based teaching strategies all contribute to the development of positive attitudes. These results highlight the need for ESP course designs that closely integrate physics-related materials to strengthen students' readiness for scientific communication.

Keywords: *English for Specific Purposes (ESP), student attitudes, physics education, motivation, student perceptions.*

INTRODUCTION

English for Specific Purposes (ESP) is English language instruction designed to meet professional or academic requirements in specific fields, such as physics education, which still warrants further research. In response to ongoing developments in science and evolving workplace demands, needs analysis, as

the systematic process of identifying the specific language skills required by learners' academic or professional contexts, remains a fundamental and continually necessary component of English for Specific Purposes teaching and learning (Anthony, 2018). This is in line with a recent study that stated that the use of contextual and authentic English in science classes improves students' understanding of physics (Rahman & Nur, 2021). Therefore, ESP is crucial to help physics education students acquire communicative English language skills that are appropriate to the academic and practical requirements of their profession.

A review of previous studies reveals several gaps in needs analysis that remain insufficiently explored. A recent study demonstrated increased interest in examining students' perspectives on ESP across various STEM (Science, Technology, Engineering, and Mathematics) disciplines. Students' perceptions of ESP learning substantially impact their motivation, engagement, and overall academic achievement (Anthony, 2018). Another study showed that STEM students often have favorable views of ESP, as the course enhances their understanding of academic English communication and specialized comprehension (Rahman & Nur, 2021). Furthermore, increased motivation is seen when ESP material is well-connected to the learning objectives and setting of disciplines, such as technology, engineering, or physics, allowing students to perceive the subject as more significant and relevant (Tarnopolsky & Vushkina, 2020). However, no study has yet examined students' specific perspectives on the elements that directly influence their attitudes, motivation, and engagement in the ESP learning process.

Recent developments have encouraged teachers and researchers to integrate project-based learning and digital technology into ESP teaching. Language learning becomes more relevant and engaging when teachers use digital technology in ESP to create learning environments that include real-time feedback, interactive simulations, and realistic resources (Belcher, 2019). Technology-based project-based learning (PBL) in ESP helps students improve their linguistic and disciplinary skills by having them collaborate on solving real-world problems using digital resources (Rachmawati & Irawan, 2023). To prepare students for the needs of the academic and professional world in the future, ESP combines digital technology and project-based learning, which encourages active, contextual, and skills-oriented language learning. Therefore, more in-depth research is needed to obtain concrete evidence directly from students' perspectives. This is important to examine so that the application of the latest learning methods and media, widely claimed to help students, can elicit positive responses from students specifically, and avoid one-sided claims.

Recent studies have increasingly focused on the need for ESP in physics education for several reasons. First, the demand for discipline-specific academic communication in physics is increasing in the digital age. Physics students are not only required to understand complex scientific texts but also to actively produce research-oriented written and oral presentations in English without barriers. This aligns with a study that says the use of language in real academic and professional contexts, such as reading research publications and producing lab reports, is the focus of ESP in science (Anthony, 2018). Second, English serves as the primary language of scientific publication and international collaboration, both academically and professionally. A lack of alignment between ESP instruction and the discipline's needs can hinder students' academic performance and professional preparedness. Therefore, investigating the effectiveness of ESP instruction in physics education is crucial to ensure that language instruction effectively supports students' engagement in scientific discourse. According to Basturkmen (2020), creating successful ESP courses requires a thorough grasp of students' disciplinary needs, especially in disciplines such as physics and the natural sciences. In conclusion, teachers can create more pertinent, interesting, and successful English learning experiences that improve language and scientific competencies by concentrating on the unique ESP needs of their students in physics and science education.

Students' views about ESP have been the subject of several studies, although most of the material now in publication is still too general and does not adequately handle disciplinary differences. Most previous research examined attitudes towards ESP in general without considering differences in fields of study. Previous research investigating Informatics students' perceptions of ESP and emphasizing

the need for ESP tailored to their field focused more on technical writing and professional presentations, not specifically related to physics (Arifiana & Suryanti, 2024). Furthermore, Dwisusila et al. (2023) examined English language learning needs, focusing on students in the Faculty of Science and Technology in general, without comparing the needs across different disciplines. Physics education itself is a combination of pure physics and pedagogical science, which naturally has more specific and different needs. Moreover, Anthony (2018) claims that a large portion of the early ESP research tended to generalize learners' demands and attitudes without considering the context-specific variations between academic subjects. There is an important need for ESP research that emphasizes the need to adapt language instruction to the specific context of the physics education discipline, as students' motivations, perceptions, and learning processes vary across fields of study (Arslan, 2021). However, despite this theoretical emphasis, much ESP research examining students' perceptions has focused very limitedly and not specifically on a specific context such as physics education. Consequently, the factors shaping physics education students' attitudes, motivation, and engagement in ESP instruction remain underexplored. To address this gap, this study examines physics education students' views on ESP and the factors influencing their engagement in ESP courses.

There is still little specific research focusing on physics education students. Hutchinson and Waters (1987) claim that ESP research frequently ignores the particulars of topic areas like physics education in favor of concentrating on the general needs of English language learners. According to Basturkmen (2020), there is still a dearth of ESP research in science, especially physics, even though this profession requires special academic communication abilities that set it apart from other fields. Additionally, a study by Harahap and Lubis (2023) shows that English language learning in physics lacks contextualization and applicability due to a lack of research and creation of ESP materials tailored for this discipline. Therefore, further research is needed that focuses specifically on physics education students so that ESP teaching can be developed according to the academic needs and characteristics of the discipline.

Research focusing on physics students is needed to develop a relevant and contextual ESP curriculum. Effective ESP curriculum development, according to Flowerdew and Peacock (2019), must be founded on the unique requirements of students in each subject in order to ensure that the learning resources are suitable for their academic setting. ESP courses must be customized to the specific terminology and scientific communication patterns in physics, since recent studies have also revealed that students in this subject have distinct linguistic and intellectual traits from students in other fields (Hasibuan & Kurniawan, 2022). Additionally, a contextual approach in ESP can boost student involvement and assist them in making the connection between language and practical scientific procedures, according to Dzakiria (2021). Therefore, research that specifically highlights the needs of physics students is crucial to produce an ESP curriculum that is adaptive and oriented to real academic needs.

Beyond the academic and theoretical aspects, several empirical studies also emphasize the benefits and practical difficulties that influence students' experiences with ESP. For some students, ESP is challenging and unrelated to their course of study. The absence of a clear link between the English language instruction and the academic or professional context of their field was cited by ESP students as their largest obstacle, which made them believe that the learning was less significant. Other studies have found that participants tend to see ESP courses as merely prerequisites and that the material is less relevant to field demands, which lowers their excitement for learning (Hasibuan & Kurniawan, 2022). Therefore, in order to reduce barriers to understanding and feelings of irrelevance, it is crucial to create ESP programs that directly link content to the context of students' fields of study.

Others believe that ESP can help people become better communicators in science. According to Hyland (2019), in addition to teaching language, ESP's primary goal is to help students comprehend how to communicate in academic and professional contexts, particularly when publishing scientific articles. According to a study by Rahmawati and Hidayat (2022), ESP application in science and technology also helps students acquire technical jargon and increases their confidence when

presenting their scientific discoveries in English. Therefore, ESP is very important to help students develop their scientific communication skills when activities and materials are created, taking into account the academic environment and the needs of the scientific field.

Students' attitudes are influenced by motivation, learning experience, and teaching methods. Motivation is a crucial component in determining students' attitudes toward language acquisition since internal motivations and individual objectives can affect their involvement in the process, claim Dörnyei and Ushioda (2021). Participating in interactive teaching approaches and having a positive classroom experience can greatly improve students' attitudes about learning English for Specific Purposes, according to research by Prastika and Kurniasih (2023). Therefore, it is impossible to isolate students' attitudes towards ESP from the confluence of their own motivations, previous educational experiences, and lecturers' teaching methods.

In addition to these empirical findings, several foundational theories in language learning further explain why students' attitudes, motivation, and contextual relevance play a crucial role in determining the success of ESP instruction. Learning achievement and student engagement can both be enhanced by positive attitudes. Students good learning attitudes are more likely to be engaged because they believe that learning is significant and helpful for their personal growth, claim Dörnyei and Ushioda (2021). Further research by Prastika and Kurniasih (2023) shows that good attitudes are also strongly associated with better academic achievement, especially when students are exposed to a good and supportive learning environment. Thus, developing a positive outlook towards education is an important factor in increasing students' active participation and academic achievement in various learning contexts.

Motivation plays an important role in determining the success of learning English. According to Dörnyei and Ushioda (2021), motivation is essential to the language acquisition process since it dictates the amount of work and perseverance pupils put in. Anthony (2018) indicates that highly self-motivated students tend to show improved skills in English speaking and writing. According to a study by Belcher (2019), a classroom setting that fosters positive attitudes and use engaging teaching strategies can greatly increase student motivation and improve academic results. Thus, the success of English learning is greatly influenced by the level of students' learning motivation, which needs to be developed through relevant and inspiring teaching approaches.

Based on the background and existing research gaps, this study aims to examine the attitudes of physics education students toward the ESP course. The research questions guiding this study are:

1. How do physics education students feel about ESP courses, are they positive, neutral, or negative?
2. How do students perceive the value and applicability of ESP to their academic and professional needs?
3. What factors influence students' perspectives on ESP education?

LITERATURE REVIEW

The Indicator of Students' Attitude toward ESP Instruction

Various factors influence attitudes toward ESP instruction in STEM fields. Perception, instructional methods, and relevance to the curriculum are crucial elements in determining student attitudes. These variables are crucial for increasing student motivation and engagement in the learning process. According to Aslan and Akbarov (2012), students are often dissatisfied with ESP instruction because it does not meet the academic needs of their specific fields. Students are often exposed to general experiences that focus more on general English than on understanding the technical terminology required in their fields of study (Brilianti & Rokhim, 2024). Essentially, an effective instructional strategy for ESP in the STEM context in higher education uses a student-centered approach. Students should be given the freedom to explore their needs more independently. This will significantly impact their attitudes

toward ESP instruction (Alqahtani, 2015).

Furthermore, ESP instruction must integrate practical applications with real-world scenarios to stimulate student motivation and engagement, encouraging active participation in the learning process (Wang, 2024). Furthermore, the academic environment plays a crucial role in shaping student attitudes. Students should be provided with a supportive environment that encourages hands-on practice and training. Furthermore, they must be given space to think critically and explore freely, both individually and in groups. This practice should also involve real-world activities, such as laboratory work, presentations of research materials and results, scholarship interviews, or interactions with established and renowned professionals in their respective fields.

Furthermore, student attitudes can be understood through the concept of multidimensional constructs, which encompass cognitive, affective, and behavioral aspects. ESP students' attitudes toward course instruction are closely related to their perceptions of the course material's relevance, usefulness, and appropriateness to their field (Hutchinson & Waters, 1987). Meanwhile, Gardner (1985) defines student attitudes as their beliefs, emotional responses, and willingness to engage in learning. Attitudes are also reflected in their evaluations of teaching methods, media used, and the academic benefits they directly experience. This positive attitude is reflected in their interest, satisfaction, and active participation in completing assignments (Arslan, 2021; Otanjac, 2021).

The Role of ESP in the Academic and Professional Needs of Physics Pre-Service Teachers

The role of ESP in students' academic and professional development is to equip them with the language skills required for specific scientific and professional fields (Khamis & Ho-Abdullah, 2017; Tayaa & Bouaziz, 2016). Furthermore, ESP should enhance their vocabulary of technical terminology in scientific fields, enhance their understanding of scientific texts, and enhance their ability to communicate complex content and concepts clearly and easily (Kausar, 2025). Students are also required to communicate these skills through published scientific papers (Bankole et al., 2023; Bouguebs, 2018; Khan, 2020; Shi, 2013).

From a theoretical perspective, ESP must play a role as a bridge between students' needs and desires. Hutchinson and Waters (1987) stated that each discipline has different goals and contexts. ESP must prioritize the needs of students according to their specifications rather than General English (GE). The role of ESP must also be created and developed based on a systematic needs analysis in the field on an ongoing basis because changing times demand developments that may lead to acceleration and renewal (Basturkmen, 2020). However, in practice, there will certainly be many challenges in implementing this. ESP students with a clear interest in language will have varied linguistic backgrounds (Freckmann & Komoreck, 2019). In other words, ESP learning instruction must be able to act as a fair facilitator and reach all students with diverse backgrounds. Furthermore, limited resources and institutional support in ESP implementation will also be a major challenge that all parties must prepare for (Khan, 2020).

ESP Instruction in Physics Education Context

Instruction in ESP focuses on combining specialized language abilities with fundamental physics concepts. This integration seeks to enhance efficient scientific communication, academic literacy, and critical thinking. ESP should offer a curriculum that aids students in comprehending and creating physics-related documents, interpreting lab directives, and expressing scientific reasoning through English as the instructional language (Descamps et al., 2024; Wulff, 2023). ESP instructors need to create teaching guidelines that promote student intellectual involvement and academic authority. Instructors need to incorporate English into physics-related experimental, research, and problem-solving activities (Sundstrom et al., 2023). Additionally, ESP in physics education should act as a driving force for curriculum reform by integrating interactive, inquiry-driven, and practical learning methods that meet students' academic requirements and career goals (Verawati & Nisrina, 2025).

Project-Based Learning (PBL) leads ESP education by incorporating digital technology as a key teaching method, especially in STEM fields. PBL is utilized as it corresponds with ESP principles,

integrating language learning with genuine, discipline-related activities that mirror real-world academic and professional practices (Dudley-Evans & St. John, 1998; Hutchinson & Waters, 1987). PBL using digital tools enhances access to diverse and extensive learning materials. Numerous digital media offer collaborative platforms, while certain AI tools can deliver genuine scientific discussions and practices suited to the contexts required by students. Digital integration in PBL enhances active engagement among students (Dede, 2014; Thomas, 2000). Digital PBL in STEM-focused ESP has demonstrated the ability to promote significant use of English via inquiry-driven projects, research, problem-solving, and cross-disciplinary collaboration, all crucial for cultivating academic literacy and professional communication abilities (Bell, 2010; Guo et al., 2020). Consequently, current ESP studies are placing greater emphasis on digital PBL as an essential learning approach for tackling the intricate linguistic and communicative requirements of STEM fields.

In physics education, ESP instruction frequently employs student-centered approaches like PBL and Content and Language Integrated Learning (CLIL), emphasizing language application in genuine physics scenarios. These methods have been demonstrated to improve collaborative learning, critical thinking, and conceptual comprehension by involving students in physics-related projects, scientific conversations, and comparative evaluations of global literature (Kuznetsova & Niyazova, 2024; Stan, 2022). As a result, students in physics education show heightened involvement in English-language academic tasks, such as scientific writing and publication, while considering varying language proficiency levels (Uddling & Uddling, 2021).

METHODOLOGY

Research Context and Sampling

This study has been carried out in the Physics Education Study Program at a public institution in Indonesia. This university was selected due to its regular provision of ESP courses within the mandatory curriculum for Physics Education students. This environment presents a pertinent opportunity to analyze student attitudes towards ESP learning, especially in addressing academic requirements and enhancing scientific communication skills in physics.

This study employed a purposive sample strategy to guarantee that participants possessed traits relevant to its research objectives. Two criteria for inclusion were defined in the selection of the sample. Initially, participants consisted of the current undergraduate students in the Physics Education Study Program at the institution. Secondly, participants had completed an ESP program, offering them immediate insight into the content, pedagogical methods, and context of academic English used in physics.

Measures

Demographic Information. This study utilises a descriptive quantitative methodology to provide an objective analysis of students' perceptions of ESP classes gathered from survey responses. This method makes sense as it emphasizes the numerical representation of data without changing any variables, allowing the researcher to illustrate students' perspectives through clear and measurable indicators (Anthony, 2018). It also enables the identification of trends related to students' motivation, interest, and perceptions using factual responses collected through Likert-scale items (Basturkmen, 2020). In addition, the use of descriptive statistics helps illustrate the extent of students' attitudes and the factors that shape them, such as previous learning experiences and the relevance of ESP to their professional development (Rahman & Nur, 2021). Therefore, the descriptive quantitative method presents an ordered and reliable framework for analyzing general trends in students' attitudes toward ESP.

The participants consisted of approximately 80 students, selected through purposive sampling. This technique was chosen based on its emphasis on the people involved in ESP learning, therefore guaranteeing that the gathered data closely corresponds with the study's aims. This method is used by intentionally choosing participants who possess characteristics that match the purpose of the study.

For this reason, it was regarded as the most suitable technique for obtaining meaningful and context-appropriate responses (Hutchinson & Waters, 1987). In this case, the sample consisted of physics education students who had completed an ESP course (Basturkmen, 2020).

Participants were selected specifically because they met the aims of the research. This follows Basturkmen's (2020) recommendation that ESP learners should be examined within their disciplinary context to ensure the accuracy of the findings. Flowerdew and Peacock (2019) also argue that participant selection must correspond to the research goals so that the data accurately reflect the target group. Since all participants were physics education students with prior ESP experience, their insights were directly relevant to the study (Hasibuan & Kurniawan, 2022). Their involvement made it possible to analyze both their general attitudes and the factors influencing them, such as perceived relevance and motivation. Thus, the participant selection process ensured that the findings genuinely represented the experiences of ESP learners in physics education. Since the participants shared similar learning experiences, the data collected were considered valid and credible, reflecting their genuine views on ESP instruction (Rahmadani & Fitriani, 2023). The criteria favored learners who had previously engaged with academic English in the field of physics in guaranteeing that their remarks were accurate and relevant (Wicaksono & Sari, 2022). To determine how background traits could affect opinions, demographic data such as gender and semester were also gathered. The respondents consisted of physics education students who had previous ESP experience, enabling accurate data for analysis.

English for Specific Purposes Attitude and Motivation Questionnaire (ESP-AMQ). The questionnaire uses a five-point Likert scale to assess opinions about English for Specific Purposes (ESP). The researcher developed the questionnaire based on several major theories, namely, Hutchinson and Waters (1987), Dudley-Evans and St. John (1998), and Robinson (1991). The questionnaire consists of 50 statements with five themes: cognitive, affective attitude, action and effort, relevance and usefulness of ESP in physics education, course design, and teaching factors, with 10 statements in each section of the theme. Anthony (2018) believes that Likert scales are important tools in ESP research as they enable researchers to assess learners' views and motivation levels. The questionnaire items were derived from acknowledged attitude models that encompass cognitive, emotional, and behavioral characteristics (Basturkmen, 2020). This corresponds with Belcher's (2019) assertion that ESP surveys must accurately represent authentic classroom environments and the scholarly requirements of students. Therefore, the instrument offered a systematic and reliable means of gathering organized data on students' perceptions of ESP within physics education. This questionnaire also went through an expert validation process involving two experts in the field of ESP by providing their validation views with indicators, content suitability, grammatical accuracy, construction clarity, meaning clarity, context suitability, respondent suitability, redundancy and coverage, and scale suitability.

Perception Questionnaire for Physics Education Students (ESP-APQ-PE). Section A covered demographic details, namely age, gender, semester, and GPA. These factors allow the researcher to discern potential disparities in attitudes based on background characteristics (Rahmadani & Fitriani, 2023). Dörnyei and Ushioda (2021) assert that demographic information is crucial in attitude research as it elucidates aspects that may influence learners' views. Including such variables follows Basturkmen's (2020) recommendation that ESP research should consider learners' academic contexts. Consequently, Section A provided an important foundation for interpreting the variations in students' attitudes toward ESP.

Section B consisted of statements measuring students' attitudes toward ESP. Anthony (2018) indicates that attitude statements empower researchers to analyze student views through consistent and standardized items. The evaluations of the assertions took place using a five-level Likert scale, spanning from a firm level of disagreement to a firm level of agreement (Dörnyei & Ushioda, 2021). Following Basturkmen's (2020) structure, every question was designed to align with the thinking, feeling, or action-related elements that make up an attitude. Investigations evaluated whether ESP improved students' understanding of physics-related English texts or augmented their academic

communication abilities (Prastika & Kurniasih, 2023). Experts have evaluated the elements, ensuring clarity and content relevance, as noted by Hasibuan and Kurniawan (2022). Section B thus offers numerous insights into students' perceptions of ESP.

Section C addressed students' perceptions of the benefits, relevance, and challenges of ESP. Rahmadani and Fitriani's (2023) study looked at how ESP helped students understand physics ideas better, talk to each other more clearly, and get ready for the careers they would have in the future. According to Basturkmen (2020), the value of ESP hinges on the degree to which the resources used in the course line up with what is needed in the field of study. The component also evaluated challenges to learning, including complex terminology and restricted access to genuine resources, prevalent in ESP situations (Hasibuan & Kurniawan, 2022). The responses helped identify both strengths and areas needing improvement (Rahmadani & Fitriani, 2023).

Data Collection and Data Analysis

The questionnaire was prepared and validated through expert review. It was derived from earlier tools used to measure attitudes toward ESP and modified to fit the setting of physics learning. The first version was reviewed by a panel of three specialists who looked at how well it was written, how correct it was, and how suitable it was (Hasibuan & Kurniawan, 2022). Several sentences were changed according to the comments given to ensure they were more in line with the research aims, using the advice from Dörnyei and Ushioda (2021) on how to make attitude questions better. The final version was approved by specialists, confirming that it encompassed every aspect of attitude and had substantial content validity (Anthony, 2018). This process confirmed that the questionnaire was appropriate and reliable for measuring attitudes toward ESP. Cronbach's Alpha was used to test reliability without separate pilot testing. This was conducted because this study was a descriptive survey, which allows for direct reliability testing based on the survey results themselves. The reliability test results showed a value of 0.83, which is interpreted as good reliability.

The questionnaire was disseminated through Google Forms and printed copies. Google Forms streamlined the data collection process and provided automated recording capabilities (Rahmadani & Fitriani, 2023), whereas traditional paper forms were used to cater to individuals who had trouble accessing the internet (Hasibuan & Kurniawan, 2022). Dörnyei (2020) highlights the idea that using survey methods that are easy to access can improve the survey responses. Combining both methods reduced potential bias and increased participation (Cohen et al., 2018). Therefore, the dual format distribution ensured inclusivity and reliable data collection.

Participants' responses were collected over two weeks. Digital replies were instantly saved, whereas physical replies were inputted by hand and verified by the investigator (Rahmadani & Fitriani, 2023). Dörnyei (2020) highlights the importance of safeguarding the honesty of the data and the privacy of those involved from beginning to end. Only complete and valid responses from students who had taken ESP were included (Basturkmen, 2020). This careful collection ensured an accurate dataset for analysis.

Data were then compiled and organized for analysis. A numerical number (1–5) was assigned to each response option. For descriptive statistical analysis, all the replies were combined into a single data set. Since the study used a descriptive survey methodology, neither qualitative nor thematic coding was used in this instrument. Every answer was put together into one large collection of information (Hasibuan & Kurniawan, 2022). The person doing the research made sure the data was accurate by looking for any parts that were missing or showing up more than once, using advice from Creswell & Creswell (2018). Descriptive results should be structured well to ensure they precisely show what learners perceive, according to Basturkmen (2020). According to Anthony (2018), each element was given a numerical code that corresponded to the Likert scale. This step prepared the dataset for further statistical analysis (Rahmadani & Fitriani, 2023).

Students had ample time to carefully complete the questionnaire throughout the two to three weeks of data collection. Rahmadani and Fitriani (2023) state that in order to guarantee timely submissions,

the researcher worked with student representatives. This duration follows Cohen et al.'s (2018) suggestion that longer collection periods help minimize non-response bias.

The data collection schedule was adjusted to students' availability after completing the ESP course. Flexible scheduling lessens restlessness and boosts involvement, claim Creswell and Creswell (2018). After the course, responses are gathered to guarantee that assessments accurately represent students' overall learning experience (Dörnyei, 2020). Aligning the schedule with academic routines improved participation and response quality (Cohen et al., 2018).

The researcher discarded inconsistent and incomplete responses throughout the data reduction process. This came after the reduction procedure that Miles et al. (2019) outlined. To prevent duplication, replies from both online and printed sources were examined (Rahmadani & Fitriani, 2023). This step ensured the reliability of the dataset (Anthony, 2018).

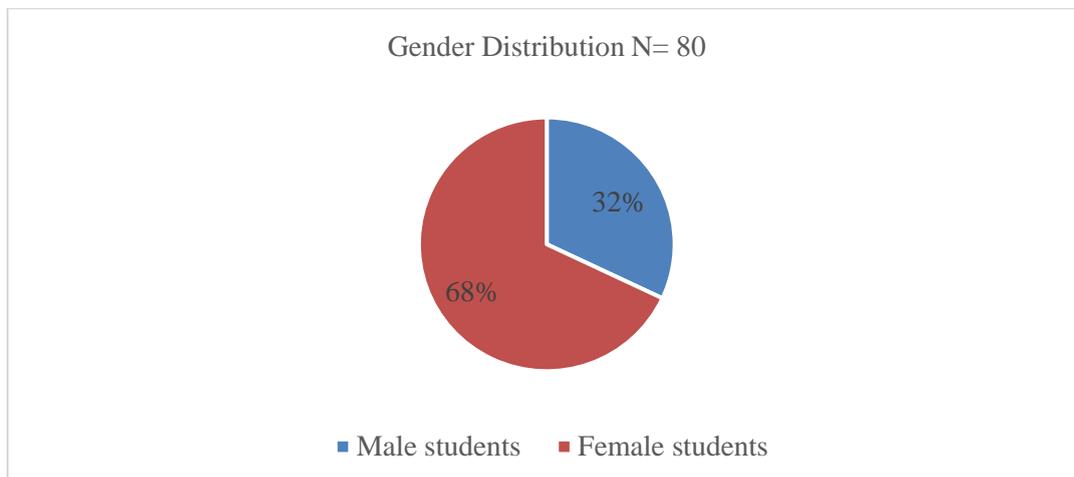
Descriptive statistical methods, specifically frequency counts, percentages, and averages, were employed to examine the encoded information. The questionnaire data were analyzed using descriptive statistics. Mean scores were calculated for each dimension and for the overall scale to represent students' attitudinal tendencies toward ESP instruction. To facilitate interpretation, the mean scores were categorized into attitude levels based on predetermined intervals of the five-point Likert scale. Creswell and Creswell (2018) highlight the ability of descriptive statistics to offer an understandable overview of numerical findings. The examination was useful in determining the attitude elements that displayed more pronounced or less notable reactions (Basturkmen, 2020). Descriptive analysis guaranteed that the results maintained objectivity, could be measured numerically, and were straightforward to understand (Hasibuan & Kurniawan, 2022). Consequently, a thorough picture of students' opinions about ESP was given using descriptive statistics.

RESULTS

Demographic Information

From the 80 responders, roughly 68% were female, whilst males constituted about 32% of the sample. The majority of responders were in their mid to late academic terms, signifying experience in learning academic English and having completed ESP courses. This scenario offers a useful structure for examining students' perspectives of ESP, especially their knowledge of the essential function of English in educational settings and the field of physics. Although the demographic data shows an imbalance between males and females, this is consistent with the male-female ratio in the physics education study program, which is dominated by female students rather than male students. Nevertheless, this profile still demonstrates the respondents' academic readiness to evaluate ESP teaching based on their experiences in this course. Their experience demonstrates their familiarity with the field, which is expected to provide reflective and informative information. Students have also completed various writing, reading, and speaking assignments with English texts, contributing to a deeper understanding of how ESP can contribute to the development of their academic understanding. In other words, the characteristics of the respondent groups strengthen the interpretive value of the survey findings.

Figure 1.
Gender Distribution of The Respondents



Respondent characteristics help understand the context of students' attitudes towards ESP. According to questionnaire data, the majority of participants in this study were female students, with around 68% of responses being female and 32% being male. Since the majority of responders were in their middle to last semesters, they had prior experience studying English in both academic and professional settings. Because their experiences and background influence favorable opinions of the course, the features of respondents offer a crucial foundation for comprehending students' attitudinal inclinations toward ESP learning. The analysis of the questionnaire revealed that students demonstrated a positive mindset toward ESP, as evidenced by an overall mean score of 3.84 on a five-point Likert scale. This study reveals that Physics Education pupils usually regard ESP as a valuable course, especially for enhancing their comprehension of scientific literature, competency in technical terminology, and academic communication abilities in physics. To get a clearer picture, you can see the pie chart below. It clearly answers how physics education students feel about ESP courses as the first research question.

Descriptive Statistics of Students' Attitudes

The study used descriptive analysis to determine the level of students' attitudes towards ESP. A questionnaire with 50 statements completed by 80 participants in the Physics Education Study Program served as the study tool. According to the analysis's findings, students' opinions of the ESP course were generally good, with an average score of 3.8 out of 5. Only 11.67% of respondents indicated that they disagreed or strongly disagreed, compared to 56.87% who selected the agree and strongly agree categories, and 31.47% who were indifferent. These results show that the majority of students had a favorable opinion of the usage of ESP, mostly because the course is thought to aid in their comprehension of English-language literature and physics terminology. Therefore, it can be said that the descriptive analysis's findings characterize students' attitudes about ESP, which are generally favorable when it comes to learning physics. This section also answers the first problem formulation.

Table 1.
Descriptive Statistics of Students' Attitudes Toward ESP

Dimensions	Mean	Category
Motivation	4.10	Positive
Relevance	3.92	Positive
Learning Experience	3.76	Neutral-Positive
Teaching Method	3.58	Neutral-Positive

Students' Perceptions of ESP

ESP is beneficial for improving students' academic skills, including reading and writing. Survey results show that the majority of students stated that their academic writing and reading skills improved thanks to ESP. 68% of respondents acknowledged that ESP improved their academic writing skills, particularly in writing abstracts and scientific reports, and nearly 72% said that ESP helped them understand difficult scientific vocabulary and sentence construction. Both reading comprehension and scientific writing had average Likert scale scores of 3.98 and 3.88, respectively. These findings indicate that ESP significantly improves students' academic literacy in physics.

ESP supports students' ability to understand scientific literature and communication in science. According to the results of the questionnaire, the majority of students agreed that ESP improved their ability to communicate with others in scientific contexts and their understanding of scientific content. Almost 66% of respondents said that ESP increased their confidence while speaking in academic contexts, and almost 70% said that ESP helped them recognize technical terms in research publications. These findings show how ESP enhances students' scientific literacy and communication skills.

Students face difficulties in understanding scientific language and technical terminology in physics. According to the results of the questionnaire, some students reported difficulty understanding technical jargon and scientific terms. 38% of respondents reported no concerns, and 14% reported difficulty grasping concepts. While more in-depth training may still be needed, this suggests that ESP aids comprehension. The data below explains how students perceive the value and applicability of ESP to their academic and professional development.

Table 2.

Students' Perceptions of the Relevance of ESP

Indicator	Agree (%)	Mean
ESP helps reading physics texts	61%	3.98
ESP helps scientific writing	58%	3.88
ESP supports terminology mastery	54%	3.79
ESP is relevant to academic needs	63%	4.05

Factors Influencing Students' Perspective

The analysis focused on finding out the extent to which learning motivation is related to the formation of students' attitudes towards ESP. The majority of students showed strong learning motivation while enrolled in the ESP course, according to the findings of the descriptive study. According to 71% of students, they were motivated to learn ESP because they thought it would help them better understand scientific material. A significant impact on the development of positive attitudes was shown by the average motivation level of 4.12.

The research was aimed at analyzing the role of English language experience in shaping students' self-confidence and attitudes towards ESP. Approximately 65% said that prior exposure to English, whether via official or informal education, enhanced their comprehension of ESP materials. Students with greater experience had more favorable sentiments overall.

The analysis explores how learning methods can influence students' levels of engagement and attitudes towards ESP. The average student evaluation of the ESP learning approach was 3.87, which is regarded as good, according to a descriptive analysis of the questionnaire data. About 79% of

respondents said that different approaches, like group discussions, presentations, and reading assignments for scientific materials, increased their level of activity and engagement in the learning process. Additionally, 76% of respondents said that the interactive and pertinent learning approach enhanced their comprehension of ESP's scientific terminology and context. These results indicate that varied and student-centered learning methods contribute significantly to increased student engagement and positive attitudes toward ESP courses.

It is important to note that the terms “strong” and “moderate” in this study do not indicate causal influence or statistical relationships. Instead, they represent the relative prominence of each factor as perceived by students, based on descriptive mean scores. Higher mean values indicate factors that are more strongly perceived or emphasized by students in their responses. The interpretation of factor levels was based on mean score ranges derived from the five-point Likert scale. Mean scores above 4.00 were categorized as indicating a strong perceived factor, while mean scores between 3.41 and 4.00 were interpreted as moderate.

Table 3.
Students’ Perceived Factors Related to Perspective Toward ESP

Factor	Mean	Perceived Level
<i>Motivation</i>	4.12	<i>Strong</i>
<i>Prior English Experience</i>	3.87	<i>Moderate</i>
<i>Teaching Method</i>	3.64	<i>Moderate</i>

The results center on the overall patterns of physics education students' attitudes toward ESP. With an overall mean score of 3.84, which is in the favorable category, the questionnaire analysis revealed that students typically had a positive attitude about ESP learning. The majority of respondents stated that the ESP course helped them meet their learning objectives, especially in terms of improving their capacity to comprehend scientific data and successfully communicate in academic settings. Additionally, a large number of students reported that ESP education helped them improve their English skills, particularly in reading academic materials and writing research papers. These findings imply that students studying physics education have positive attitudes toward ESP and understand the value of English language proficiency for their academic and career advancement.

The analysis indicates that students’ perceptions, motivation, and prior experience collectively characterize their attitudes toward ESP. Three primary factors, perception, motivation, and English language experience, showed a consistent association in influencing students' views about ESP learning, according to the descriptive analysis's findings. The mean score for students' opinions about ESP was 3.86, suggesting that they had an opinion of the course's advantages and applicability to their academic growth. The majority of students (almost 80%) were motivated to acquire ESP since it was thought to enhance their academic and professional prospects in physics, according to the motivation component, which also showed strong results with an average of 3.88. However, students who had previously had pleasant experiences tended to see ESP more favorably, as evidenced by the average score of 3.75 for prior English language learning experience. These three elements work together to promote a good view of ESP generally, and fruitful educational opportunities, supported positive opinions, and strong motivation. Thus, this finding confirms that perception, motivation, and learning experience are mutually reinforcing factors in forming positive attitudes of physics education students towards ESP learning.

The factor study was conducted to identify the main influences forming students' attitudes towards ESP. With an average score of 3.88, which indicates a high degree of agreement among respondents, the questionnaire analysis revealed that learning motivation had the biggest impact on forming students' attitudes toward ESP. Results were strongly impacted by the perceived relationship between ESP and students' academic goals, with a mean score of 3.86. This implies that students thought ESP

was a useful subject for understanding scientific information and scholarly discourse. Furthermore, as indicated by the mean score of 3.75, earlier experiences with learning English also contributed to the development of positive attitudes. This indicates that students are more likely to accept ESP resources if they have previously experienced success studying English. As a result, the evidence suggests that students' favorable sentiments on ESP are primarily motivated by their desire, with their knowledge and education serving to reinforce this effect.

DISCUSSION

The findings of this study demonstrate that physics education students are generally positive toward ESP, with an overall mean score of 3.84 on a 5-point Likert scale. The results demonstrated that physics education students had favorable attitudes toward ESP learning, indicating that ESP is seen as helpful for enhancing English language abilities in line with academic demands. These findings align with Dörnyei's (2020) L2 Motivational Self-System, which describes how attitudes are shaped in learners when language acquisition directly supports their academic identities and long-term objectives. Similarly, Coxhead (2020) highlights that students' confidence in interacting with academic texts is much increased by contextualized ESP learning. The results showed that students thought ESP helped them read and write better scientific articles in English, particularly physics-related ones. Accordingly, our findings confirm the theoretical idea that when learning is explicitly related to the students' disciplinary environment and improves academic success, their views about ESP become more encouraging.

Furthermore, the generally positive perspective on ESP teaching indicates its development from a supporting course to an integral component of physics education. Several factors support this shift. First, ESP courses have been shown to improve students' methodological and cognitive competencies in physics (Bravo et al., 2019). Furthermore, ESP courses also provide critical thinking skills and social awareness in scientific fields (Wang & Stojković, 2024). These responses indicate that English language proficiency is important for improving understanding of learning resources and actively participating in the global academic community. These positive results also align with research by Bravo et al. (2019), which found that increased student confidence and satisfaction with ESP courses correlate with improved academic performance and quality in physics education.

The research results can be a basis for improving ESP learning design to be more appropriate to the scientific context of physics. It also indicates that physics education students generally demonstrated a strong positive orientation toward ESP learning. This shows how important it is for students to acquire English that is appropriate for their academic setting. Most respondents said using ESP materials on physics issues improved their ability to read scientific papers, comprehend technical words, and speak more confidently in academic settings. These results support the findings of Fitria Lapele et al. (2024), who showed that students have higher motivation when ESP materials are tailored to their field of study, as this makes learning more meaningful and applicable. The degree to which the materials are contextualized within a particular field of study is another factor that determines how effective ESP learning is, according to Basturkmen (2020) and Coxhead (2020). According to Safranji et al. (2024), an ESP design that is pertinent to the scientific domain might enhance students' intrinsic motivation and self-regulation when they are learning academic English. Therefore, by integrating the scientific context of physics into the ESP learning design, the learning process becomes more meaningful, motivating, and increases students' readiness to communicate in academic and professional fields.

Further interpretation of the findings highlights that students' positive attitudes toward ESP are strongly connected to the growing emphasis on disciplinary literacy in science education. The capacity to use terminology, symbols, and genres unique to a scientific area is known as disciplinary literacy, and it has grown in significance in physics-related disciplines. Shanahan and Shanahan (2020) study that personalized language education is very important because the needs for reading, writing, and cognitive functions are different in every subject. Recent research on ESP in STEM fields has demonstrated that academic performance and self-assurance improve for young students when

language education includes the specific types of writing used in their fields, such as scientific debates, understanding information, and lab write-ups (Shanahan & Shanahan, 2020). According to these theoretical viewpoints, which are consistent with the current study, ESP helps physics students engage in discipline-specific literacy practices that are essential to their academic identities, leading to the development of positive attitudes.

A significant trend apparent from the findings is how crucial motivation is in forming favorable student opinions of ESP. The highest average score belonged to motivation (4.12), demonstrating that students feel a strong need to study English as they see it as beneficial to their academic achievements and prospective jobs in the scientific sector. In his study from 2019, Weiner posited his attribution hypothesis, which states that students show greater motivation if they view their learning objectives as both meaningful and within reach. Taguchi et al. (2020) underscore the vital role that motivation plays in developing positive perspectives on learning a language, particularly in fields like ESP. The study's findings support this idea: students who were highly motivated showed greater self-assurance and participation, demonstrating how motivation strengthens students' eagerness to learn English in scientific environments.

Teaching methods and learning experiences also contributed significantly to shaping students' perceptions of ESP. Interactive and context-aware educational methods are shown to be crucial in the study, with 79% of survey participants indicating greater interest as a result of student-focused strategies like debates, presentations, and investigating scholarly sources. The results support the claims made by Basturkmen (2020) and Safranji et al. (2024) that self-directed learning and an innate desire to learn are encouraged by English language instruction tailored to actual, real-life situations in certain professions. Students showed a higher regard for specialized English when the course content reflected concepts from physics, demonstrating that incorporating real-world scenarios into learning settings helps them grasp scientific publications, language, and methods of expression. Consequently, the data backs up the theoretical idea that specialized English becomes more effective when teaching strategies are consistent with the subject's academic characteristics.

The research highlights the impact of students' earlier encounters with English on their self-assurance and perspectives concerning ESP. Students who had prior exposure to English through classes, educational materials, or casual learning showed greater levels of confidence and more positive views on ESP. This aligns with the conclusions reached by Rahmawati and Hidayat (2022) and Hyland (2019), who argue that familiarity with academic English enhances students' competence in managing tasks related to scientific communication. As revealed by the present research, students who have had previous opportunities to learn English are well-positioned to actively and confidently participate in ESP learning environments.

CONCLUSION

The findings of this study demonstrate a strong connection with previous theories stating that positive attitudes contribute significantly to successful learning. The results indicate that students who approached ESP with a constructive mindset generally showed higher motivation, greater participation, and better comprehension of the course material (Rahmadani & Fitriani, 2023). This finding bolsters the theory put forward by Dörnyei and Ushioda (2021), who contend that students who have positive emotional attitudes toward language acquisition are more likely to stick with it and produce better academic results. Similarly, Anthony (2018) notes that in ESP contexts, students' attitudes play a major role in shaping their academic performance because positive dispositions encourage them to use English in discipline-specific settings. The consistency between the findings and earlier theoretical perspectives reinforces the idea that affective aspects such as motivation and self-confidence have a direct influence on language learning achievement (Basturkmen, 2020).

Furthermore, Hasibuan and Kurniawan (2022) reported that students' interest and enthusiasm for ESP are largely determined by how relevant and helpful the materials are for their academic field. Taken together, the results strengthen the argument that positive attitudes support not only learning success

but also students' continued development in using English for academic work (Flowerdew & Peacock, 2019). Hence, this study affirms the theoretical claim that positive attitudes serve as an essential factor in mastering ESP, particularly for learners in science and technology disciplines.

The study also concludes that motivation has a substantial influence on how learners perceive and engage with ESP. Dörnyei and Ushioda (2021) describe motivation as one of the most powerful affective elements shaping students' attitudes and persistence in second language learning. In an ESP setting, highly motivated learners tend to be more active because they understand the value of English for their academic advancement and future professional opportunities (Anthony, 2018). The present findings similarly show that students with stronger motivation generally develop more positive attitudes toward ESP, especially when the instructional materials closely reflect their academic specialization (Rahmadani & Fitriani, 2023). Basturkmen (2020) adds that when students clearly see how ESP topics relate to their discipline, their internal motivation increases, resulting in more meaningful learning. Hasibuan and Kurniawan (2022) demonstrate how well-crafted, contextual resources may pique students' interest and boost their confidence in learning ESP, hence supporting the link between motivation and attitude. Rahman and Nur (2021) also point out that motivation influences students' ability to utilize English to understand scientific material in addition to driving engagement. This is how incentives work to promote favorable views of ESP learning by acting as a stimulant and stabilizer. Given that motivation enhances willingness, engagement, and long-term mastery of English for academic purposes, it may be argued that motivation plays a crucial role in how students view and succeed in ESP.

The study also underscores the importance of adjusting ESP materials to meet the specific academic needs of physics students. The most successful ESP training, according to Anthony (2018), is created with the objectives of the students, their subject of study, and the situations in which they would use the language in mind. In this research, students reported that physics-related materials, such as key terminology, abstract writing, and scientific reporting, helped increase both comprehension and motivation (Rahmadani & Fitriani, 2023). Basturkmen (2020) argues that discipline-specific ESP content enhances relevance, which in turn makes students more engaged and more confident in applying English in academic and professional environments. This supports the claims made by Hasibuan and Kurniawan (2022) that realistic, context-based exercises that mirror actual physics classroom and lab scenarios should be incorporated into ESP for scientific learners. Discipline-oriented resources also bridge the gap between general English proficiency and specialized academic literacy (Flowerdew & Peacock, 2019). ESP courses are more successful in training students to read scientific publications, produce research reports, and work together in global academic environments when they directly address students' disciplinary demands (Rahman & Nur, 2021). ESP tools that are adapted to the demands of physics education, in summary, improve language proficiency and fortify the connection between English and scientific concepts and professional practice. Therefore, in order to guarantee relevance, engagement, and long-term learning success, ESP content must be adapted to the topic of physics.

Pedagogical Implication

To improve EFL performance, educators could prioritize enhancing the perceived value of English learning by connecting it to students' personal and professional aspirations. For example, integrating career-oriented activities could be highly effective. One approach is to organize guest lectures with professionals who use English in their careers, such as business leaders or international diplomats, to highlight the practical benefits of English proficiency. Another strategy is to design assignments that connect English skills to real-world scenarios, such as creating presentations or reports on industry-specific topics liked by students.

Building students' self-efficacy is also crucial. Educators should set clear, achievable goals and offer detailed, constructive feedback, as they are the sources of students' self-efficacy (Bandura, 2001). For instance, when students submit drafts of their research papers, feedback should emphasize their strengths and provide specific advice on how to improve weaker areas. Regular self-reflection exercises (such as having students assess their progress after each major assignment) can help them

recognize their achievements and adjust their strategies accordingly.

Incorporating metacognitive SRL strategies into teaching involves explicitly teaching planning, monitoring, and evaluating techniques. For example, during reading comprehension activities, educators can guide students in creating detailed reading plans, including setting specific goals and using strategies for summarizing and reflecting on the material. Teachers can model these strategies by demonstrating their thought processes during problem-solving activities, showing how to track progress and adapt approaches. Encouraging students to review and revise their learning plans regularly can help them manage their learning processes more effectively (Teng et al., 2023).

Limitations

There are two limitations of the current study. First, the exclusive reliance on quantitative methods limits the depth of understanding about how motivational beliefs and SRL influence students' learning processes dynamically. Particularly, as cognitive SRL strategies were found not to significantly affect EFL performance, an in-depth investigation, such as interviews, could provide more nuanced insights into how students apply these strategies in practice and why they may not yield the expected results. Second, the study focuses only on cognitive and metacognitive SRL strategies, neglecting other dimensions like the social behavior of SRL, which could also impact EFL performance. This narrower scope may overlook the role of peer interactions and the learning environment in shaping students' self-regulation and language outcomes, suggesting a need for broader exploration in future research.

DECLARATIONS

Competing Interests

The authors report there are no competing interests to declare.

Data Availability

The data will be available on request from the corresponding author.

Ethics Approval and Informed Consent

In accordance with the ethical principles outlined in the Declaration of Helsinki, the participant information sheet and the ethical consent form were obtained from all the participants. Besides, participants in the present study did not include children or minors. During the study, the anonymity and privacy of the participants were guaranteed, and their participation was completely voluntary.

Authors' Contributions

The corresponding author supervised the whole process and gave guidance when necessary. The first author analyzed the data and wrote the manuscript.

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