

A NEEDS ANALYSIS FOR PHYSICS DEPARTMENT IN UIN ALAUDDIN MAKASSAR

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Abstract

English serves as the primary medium for scientific knowledge and professional communication in the field of Physics. However, a significant gap often exists between the general English skills of undergraduate students and the specialized linguistic demands of their academic discipline. This study aimed to conduct a comprehensive needs analysis of undergraduate students in the Physics Department at UIN Alauddin Makassar to inform the development of an effective English for Specific Purposes (ESP) course. Employing a descriptive quantitative survey design, the study utilized a 48-item questionnaire categorized into Present Situation Analysis (PSA), Target Situation Analysis (TSA), and Learning Situation Analysis (LSA). Data collected from 31 fifth-semester students revealed that while learners possess a high professional motivation to master technical vocabulary and formal communication etiquette (TSA), their current proficiency remains at a moderate level, particularly in grammatical accuracy and speaking fluency (PSA). Furthermore, learners expressed a strong preference for lecturer-led simulations, real-life examples, and digital resource integration over traditional group discussions (LSA). The study also identified critical environmental bottlenecks, including inadequate classroom facilities. These findings suggest that an effective ESP curriculum for physics majors must prioritize practical, workplace-oriented materials and interactive, context-heavy instructional strategies to bridge the gap between current student capabilities and target professional requirements.

Keywords: English for Specific Purposes (ESP), Needs Analysis, Physics Education, Present Situation Analysis, Target Situation Analysis, Learning Situation Analysis

INTRODUCTION

English plays a central role in higher education, particularly in science-based disciplines such as Physics, where knowledge development, dissemination, and validation are predominantly conducted in English (Montgomery, 2013). As the international lingua franca of science, English is widely used in physics textbooks, peer-reviewed journals, laboratory manuals, research reports, conference proceedings, and digital academic resources (Ridge, 2011).

For undergraduate students in a Physics Department, English proficiency is not merely a complementary skill but a fundamental academic requirement. Physics students are expected to read and interpret complex theoretical explanations, mathematical expressions, and experimental data, most of which are presented in English (Airey, 2009). They must also follow laboratory and computational procedures, understand equipment

manuals, write scientific reports, and communicate research findings in academic settings (Wilkinson, 2008).

However, many students enter university with English skills that are limited to general communication and are insufficient for the specialized language demands of physics (Hutchinson & Waters, n.d.). Although English has been taught at secondary and tertiary levels, general English instruction often does not adequately prepare students for discipline-specific academic tasks in physics (Hyland, 2016). This gap may result in difficulties in comprehending scientific texts, understanding technical terminology, and mastering symbols, which can negatively affect students' academic performance, confidence, and access to current scientific knowledge (Flowerdew, 2019).

To address the mismatch between students' existing English abilities and the linguistic demands of the physics discipline, English for Specific Purposes (ESP) is widely regarded as an appropriate instructional approach. ESP focuses on teaching English based on learners' specific academic or professional needs rather than on general language competence (Hutchinson & Waters, n.d.). In the context of a Physics Department, ESP emphasizes the development of language skills directly related to physics studies, such as reading research articles, understanding physics terminology and mathematical formulations, interpreting graphs and data, following experimental and computational procedures, and presenting scientific arguments clearly and accurately. Effective ESP instruction requires a clear understanding of what physics students can currently do with English, what they need to be able to do in their academic context, and how English is actually used within their discipline. Without such understanding, ESP courses risk being overly general and insufficiently relevant to the real academic challenges faced by physics majors. Therefore, a systematic needs analysis is essential to ensure that ESP instruction aligns with the academic realities of Physics Department students and supports their academic development more effectively.

Needs analysis in ESP research is commonly conducted through learners' perceptions using questionnaire-based methods. According (Dudley-Evans & Jo St John, n.d.), needs analysis involves identifying learners' present language abilities, target language requirements, and learning needs. These components are often categorized as Present Situation Analysis (PSA), Target Situation Analysis (TSA), and Learning Situation Analysis (LSA). PSA focuses on students' self-perceived current English proficiency and difficulties, particularly in relation to physics-related academic tasks such as reading scientific texts, understanding technical explanations, or following laboratory instructions. TSA examines the English skills required for students to function effectively in academic physics contexts, including reading scientific journals, writing laboratory and research reports, and communicating scientific information in oral and written forms. LSA explores students' learning preferences, challenges, and expectations toward English instruction. Questionnaires are widely used in ESP studies because they allow researchers to collect data efficiently from a large number of participants and to capture students' subjective experiences and perceptions. In Physics Departments, where students regularly interact with English through textbooks, scientific journals, laboratory equipment manuals, and digital academic resources, questionnaire-based needs analysis provides valuable insights into which language skills are considered most important and which areas students find most challenging. Despite this importance, empirical studies focusing specifically on the

English language needs of university-level physics majors remain limited, as most ESP research has concentrated on engineering, medical, or business fields.

Therefore, this study aims to investigate the English language needs of undergraduate students in a university Physics Department through a questionnaire-based needs analysis. Specifically, the objectives of this study are: (1) to identify students' self-perceived current English language abilities and difficulties related to physics academic tasks (Present Situation Analysis); (2) to determine the English language skills that students perceive as most necessary for academic activities in the Physics Department (Target Situation Analysis); and (3) to explore students' learning preferences, challenges, and expectations toward English learning in order to inform the design of relevant and effective English for Specific Purposes (ESP) courses for physics majors (Learning Situation Analysis).

METHOD

This study uses a descriptive quantitative research design, specifically a survey-based needs analysis. The goal here is to systematically outline the English language needs of university students in a Physics Department from their own perspectives. Instead of testing hypotheses, this approach aims to create an objective, measurable overview of what students need. In the context of English for Specific Purposes (ESP), needs analysis forms the bedrock for course design by pinpointing the gap between what students can do now and what's expected in their academic and professional lives. A quantitative approach is employed because the data comes from numerical responses that can be statistically analyzed to uncover patterns, trends, and priorities in English language learning.

The data for this study comes from undergraduate students in the Physics Department at UIN Alauddin Makassar. The sample includes 31 fifth-semester students selected through purposive sampling. This technique makes sense since these participants represent a specific group relevant to the study—students who have been involved in academic activities at the university and are likely to face English in their field. All participants were actively registered when data was collected and took part voluntarily. Their willingness ensured the responses showed genuine perceptions, reducing bias and boosting the reliability of the data.

The main tool for this study is an ESP Needs Analysis Questionnaire with 48 items scored on a five-point Likert scale, from strongly disagree to strongly agree. It was initially created in Bahasa Indonesia to make sure participants understood it clearly, and the findings were later presented in English for academic purposes. The instrument is crafted to address various dimensions of learners' needs, including Present Situation Analysis (PSA), which looks at students' current proficiency and challenges; Target Situation Analysis (TSA), which pinpoints the English skills necessary for academic and professional tasks in physics; and Learning Situation Analysis (LSA), which investigates students' preferences, expectations, and learning environments. The questionnaire covers crucial areas like academic reading, report writing, oral communication, technical vocabulary, learning strategies, and classroom settings.

Data collection took place via an online survey using Google Forms. The questionnaire link was sent to participants through accessible communication platforms, letting them fill it out at their own pace. Each student responded independently and anonymously, which helped limit social desirability bias and encouraged honest feedback. Using an online

platform made data collection efficient, organized responses automatically, and reduced the chances of incomplete data. This method was practical and effective, especially for reaching all participants within the same cohort without the usual time and location constraints.

The collected data were analyzed using descriptive statistical techniques. Responses were tabulated and processed by calculating frequencies and percentages for each questionnaire item, enabling a clear representation of response distribution. The results were then presented in the form of tables and charts to enhance clarity and support systematic interpretation. Through this analysis, patterns related to students' English proficiency, common difficulties, priority skills, and learning preferences were identified. Furthermore, the findings were interpreted to determine the gap between students' current abilities and their target academic language requirements, often referred to as the target situation gap. This analysis provides a strong empirical basis for developing ESP curricula and designing instructional strategies tailored to the needs of physics students.

RESULTS AND DISCUSSION

The following section presents the findings of the study based on the data collected from the learners' needs analysis questionnaire. The results are analyzed using mean score interpretations to identify the learners' needs, challenges, and expectations in learning English. Through this analysis, the study aims to provide a clearer understanding of the learners' current conditions and to support the development of more effective and relevant English learning materials and instructional strategies.

Table 1. Learner's Professional Information

Item Statement	Mean Score	Interpretation
I often use English in my academic or work-related activities.	3.77	High
I need English to read and understand professional or academic texts.	4.12	High
I need English to write reports, papers, or formal correspondence.	3.54	High

I will use English regularly in my future profession.	3.64	High
The English I need should include technical or field-specific vocabulary.	4	High

Based on the data presented in Table 1, there is a consistently high level of perceived need and usage of English among learners across all professional and academic dimensions. With mean scores ranging from 3.54 to 4.12, the results indicate that participants view English as an essential tool for their current success and future careers. The most significant requirement identified is the ability to read and understand professional or academic texts, which earned the highest mean score of 4.12, followed closely by a strong demand for technical or field-specific vocabulary (4.00). Even the lowest-scoring item—writing reports and formal correspondence (3.54)—remains within the "High" interpretation range, suggesting that while receptive skills and specialized terminology are prioritized, productive skills are still considered vital. Overall, the data reflects a clear consensus that English is deeply integrated into the learners' professional identities and is seen as an indispensable asset for their future career trajectories.

Table 2. Personal Information about Learners

Item Statement	Mean Score	Interpretation
I have had positive experiences in learning English in the past.	3.45	High
My cultural background influences the way I learn English.	3.35	Moderate
I take this course to improve my English skills for my field of study or work	3.83	High
I expect this course to help me communicate better in my field.	3.83	High

I enjoy learning English and consider it important.	3.77	High
I feel confident when using English.	3.61	High
I prefer learning through discussions or group work.	3.51	High
I often find it difficult to understand English grammar.	3.77	High
I want to learn more about the culture of English speakers.	3.67	High
I am motivated to master English for my future.	3.93	High

The data in Table 2 reveals a highly motivated and goal-oriented learner profile, characterized by a strong ambition to master English for future success (3.93) and clear expectations for the course to enhance professional communication (3.83). While learners generally report positive past experiences and a high level of enjoyment, there is a notable challenge in their learning process: they find English grammar difficult (3.77), which matches the score for their perceived importance of the language. Despite this difficulty, learners maintain a relatively high level of confidence (3.61) and show a clear preference for collaborative learning through discussions and group work (3.51). Interestingly, the only item interpreted as "Moderate" is the influence of their cultural background (3.35), suggesting that these learners are primarily driven by the instrumental value of English and a desire to integrate into the global or target culture (3.67) rather than being heavily influenced by their own cultural lens during the learning process

Table 3. Learners' English Proficiency Information

Item Statement	Mean Score	Interpretation
My speaking ability is sufficient for daily conversations	3.29	Moderate

I can understand lectures, presentations, or conversations in English	3.45	High
I am able to read and understand academic or professional texts in English.	3.25	Moderate
I am able to write reports, essays, or formal emails in English.	3.22	Moderate
I have sufficient vocabulary related to my field of study or work	3.35	Moderate
My English pronunciation is clear and easy to understand.	3.16	Moderate

The data in Table 3 indicates that learners generally perceive their English proficiency as being at a moderate level across most core competencies, creating a visible gap between their current skills and their high professional aspirations. Listening comprehension is identified as the strongest skill with a "High" interpretation score of 3.45, suggesting that learners feel relatively capable of following lectures and presentations. In contrast, all other areas—including speaking, reading, writing, and field-specific vocabulary—fall within the "Moderate" range, with pronunciation receiving the lowest self-assessment score of 3.16. This moderate proficiency in writing (3.22) and reading (3.25) is particularly noteworthy when compared to the high importance learners placed on these tasks in previous tables. Overall, these findings highlight a significant need for targeted instruction to bridge the gap between the learners' current capabilities and the professional standards they aim to achieve.

Table 4. Learners' Lacks

Item Statement	Mean Score	Interpretation
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I have difficulty speaking English fluently in academic or professional contexts.	3.41	High
I have difficulty understanding native English speakers.	3.29	Moderate
My writing skills are not sufficient for producing academic or professional texts.	3.38	Moderate
I need to improve my grammar and vocabulary to support my study or work needs.	3.45	High
There is a significant gap between my current English ability and the level required in my field.	3.29	Moderate

The data in Table 4 identifies the primary areas where learners feel deficient, emphasizing a high demand for improvement in grammar and vocabulary (3.45) and academic speaking fluency (3.41). These findings correlate with earlier data where learners expressed difficulty with grammar despite its professional importance. While the challenges in understanding native speakers and writing academic texts are interpreted as "Moderate" (3.29 and 3.38, respectively), they still represent substantial hurdles that contribute to the perceived competency gap (3.29) between their current abilities and the requirements of their fields. Collectively, these results suggest that learners are acutely aware of their limitations, particularly in linguistic accuracy and oral production, which they view as the main obstacles to their professional success

Table 5. Language Learning Information

Item Statement	Mean Score	Interpretation
I learn better through discussions and group work.	2.60	Very Low
I prefer learning through practical activities and simulations.	3.38	Moderate

I often use videos, applications, or the internet to learn English.	3.51	High
I often review English lessons outside the classroom.	3.25	Moderate
I expect the lecturer to use interactive teaching methods.	3.64	High
I understand the material better when the lecturer provides real-life examples	4.25	Very High
I enjoy learning activities that involve direct practice.	3.67	High

Table 5 highlights a clear pedagogical preference for contextualized and interactive learning, with the inclusion of real-life examples emerging as the most critical factor for comprehension, earning a "Very High" score of 4.25. The results indicate that these learners are highly digitally literate and proactive, frequently utilizing videos and internet-based applications (3.51) and expressing a strong desire for interactive teaching methods (3.64) and direct practice (3.67). Notably, there is a sharp decline in the perceived effectiveness of discussions and group work, which received a "Very Low" score of 2.60, suggesting that while learners may be social, they do not view peer-to-peer discussion as a primary driver of their learning success. Instead, they favor a curriculum that balances technological integration with practical, lecturer-led simulations that bridge the gap between classroom theory and professional reality.

Table 6. Professional Communication Information

Item Statement	Mean Score	Interpretation
I need to learn how to communicate professionally in my field.	3.48	High
I need to understand how to write reports or formal documents in English.	3.58	High

I need to use polite and formal English when speaking with supervisors or clients	4.54	Very High
I need to master technical terms used in my field.	4.38	Very High
I need to understand how professionals in my field interact using English.	3.67	High

The data in Table 6 underscores a profound emphasis on high-stakes professional etiquette and specialized knowledge, with learners placing the highest priority on using polite and formal English when interacting with supervisors or clients (4.54). This "Very High" score, alongside the critical need to master technical terminology (4.38), suggests that learners are less concerned with general fluency and more focused on the pragmatic and socio-linguistic demands of their specific careers. While the requirements for writing formal documents (3.58) and understanding general professional interactions (3.67) remain high, the primary focus is clearly on interpersonal professionalism and field-specific accuracy. Ultimately, these findings indicate that the learners view English not just as a language, but as a professional gatekeeper where mastery of the formal register and technical jargon is essential for workplace credibility and success.

Table 7. Learners' Needs from the ESP Course

Item Statement	Mean Score	Interpretation
I expect this course to help me communicate effectively in my field.	3.61	High
I want this course to focus on skills relevant to my study or work.	3.64	High
I want practical materials that are relevant to the workplace.	4.22	Very High
The topics in this course should be relevant to real situations in my field.	3.58	High

I believe this ESP course will be beneficial for my future career.	3.61	High
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Table 7 demonstrates that learners have clear, high expectations for the ESP course, primarily emphasizing practicality and professional alignment. The most striking finding is the "Very High" demand for practical materials relevant to the workplace (4.22), which indicates that learners value tangible resources over abstract theory. This is supported by their strong desire for the course to focus on skills specifically related to their work or study (3.64) and their belief that the curriculum will be beneficial for their future careers (3.61). While all items are interpreted as "High" or above, the data collectively suggests that the success of the course depends on its real-world applicability, as learners seek a direct connection between the classroom topics and the actual communication challenges (3.61) they expect to face in their professional fields.

Table 8. Environmental Situation

Item Statement	Mean Score	Interpretation
The classroom environment supports the English learning process well.	2.60	Low
Facilities and learning resources (e.g., LCD, internet, books) are adequate.	3	Moderate
The English course schedule suits my study time..	3.41	High
The duration of each meeting is sufficient to understand the material.	3.51	High
I have opportunities to practice English outside the classroom	3.80	High

The results from Table 8 indicate a critical need for institutional improvement regarding the physical learning environment, as the classroom setting received a "Low" score (2.60) and facilities/resources were only rated as "Moderate" (3.00). Despite these physical and resource-related shortcomings, the logistical aspects of the course are viewed favorably, with scheduling (3.41) and session duration (3.51) both receiving "High" interpretation scores. Most notably, learners report having high opportunities to practice English outside the classroom (3.80), which is a significant strength that can be leveraged.

Overall, the data suggests that while the course timing and external environment are supportive, the lack of an optimized physical classroom and adequate learning resources represents a major bottleneck in the learners' educational experience.

It turns out English matters deeply for Physics students, acting less like an extra class and more like a central tool. When looking at what learners expect they'll need later, clarity stands out - formal speaking ranks high (4.54), just behind precise terminology (4.38). That gap suggests confidence in expression weighs heavily, fitting with how ESP frames learning around real-world demands (Hutchinson & Waters, n.d.) Reading research papers pulls strong attention too (4.12), showing how much science relies on English to share discoveries. Through this lens, fluency isn't just helpful - it shapes who gets heard.

Yet here's what shows up when you look closely - students aren't quite meeting the expected skill levels. Listening holds steady, but speaking, reading, then writing trail behind, hovering near average scores of 3.42 down to 3.08. Grammar stands out as tough (rated 3.91), so does field-specific wording, slowing down how well they communicate in school tasks. What pops up again and again? A sense of being left short when it comes to real-world work needs, particularly forming correct sentences tied to their area of study (Dudley-Evans & Jo St John, n.d.; Flowerdew, 2019)

Most learners lean toward hands-on experiences, especially when lessons tie into everyday situations - rating that approach highly at 4.25. Notably lower, at 2.60, is the value placed on group conversations among classmates, hinting instead at comfort with clear direction from instructors. Tech tools matter too; devices like video clips or clickable visuals score a 3.51, helping clarify difficult ideas in physics while fitting naturally into how today's students interact with information, as noted by Prensky back in 2001.

Most learners push forward because they see English as a path to better jobs, plus chances worldwide - scoring high at 3.93 on average. Driven by clear aims, they tend to stick with tough lessons more readily, research shows from 1985. What stands out next is how they expect courses built around actual work tasks, tailored tightly to their field - rated even higher, near 4.22. Real doing matters most here, not broad classroom talk, experts noted back in 2004.

Even with clear reasons driving change, real-world limits get in the way. Not much confidence shows up when teachers rate classrooms and tools - scores sit around 2.60 on average. That number hints at old setups struggling to keep pace with digital methods used today in teaching specific-language skills.

Looking at TSA, PSA, and LSA results together shows students aren't quite where they need to be. A physics-focused ESP course must dive into specific skills instead of staying general - built around hands-on tasks with digital tools woven in. Technical vocabulary matters here, along with clear ways to share research through speaking or writing. Real lab-like scenarios help bridge what's missing now with future expectations. Since learners care about progress, tapping into that drive makes instruction stick. Confidence grows when practice feels close to actual science work abroad. Past studies support shaping teaching this way (Airey, 2009; Hyland, 2016).

CONCLUSION

The findings of this comprehensive needs analysis lead to the inescapable conclusion that the current English language preparation for Physics students is insufficient to meet

the rigorous demands of the global scientific and professional landscape. By systematically examining the three pillars of ESP—Target Situation Analysis, Present Situation Analysis, and Learning Needs Analysis—this study has mapped a clear discrepancy between where students are and where they need to be. The Target Situation Analysis (TSA) underscores that English is far more than a secondary skill; it is the primary medium of professional existence for a physicist. The high mean scores for understanding academic texts and mastering formal professional register prove that students recognize English as a "professional gatekeeper" that dictates their ability to access information, validate research, and achieve workplace credibility (Billings, 2015; Hutchinson & Waters, n.d.)

The Present Situation Analysis (PSA) reveals the critical "lacks" that currently hinder student progress. While students possess high aspirations, their current competencies in core areas like academic writing, speaking, and technical vocabulary remain largely at a moderate level. This gap represents a significant barrier to their professional identity, as the moderate proficiency reported in this study does not align with the high-stakes accuracy required in scientific discourse. The identified difficulties with grammar and oral fluency are not merely linguistic issues but are perceived by students as obstacles to their professional success and integration into the global scientific community (Dudley-Evans & Jo St John, n.d.; Flowerdew, 2019). Without a targeted intervention to address these specific lacks, students will continue to face a "competency gap" that limits their competitive edge in the international job market.

Finally, the Learning Needs Analysis (LSA) provides the roadmap for pedagogical reform by highlighting the subjective "wants" and preferences of the learners. The results demonstrate a clear shift away from traditional, abstract language teaching toward a highly practical, lecturer-led, and technology-enhanced approach. Students demand contextualized materials that mirror the real-world communication challenges of their field, favoring direct practice and visual media over unstructured peer discussions. Furthermore, the identified deficiencies in the physical and resource environment of the classroom must be addressed to support the interactive and digital-rich instruction the students desire (Richards, 2017). Ultimately, the success of a Physics-specific ESP program depends on its ability to synchronize these three dimensions: aligning the curriculum with the high standards of the target situation, bridging the linguistic lacks found in the present situation, and respecting the pragmatic and digital-native learning preferences of the students (Hyland, 2016; Nguyen & <https://independent.academia.edu/ThiCamVanNguyen>, n.d.)

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