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SURVEYING THE EFFECTIVENESS OF GENERAL ENGLISH VS ESP IN CHEMISTRY EDUCATION

MENINJAU EFEKTIVITAS BAHASA INGGRIS UMUM VS ESP DALAM PENDIDIKAN KIMIA

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ABSTRACT

This study compares General English versus English for Specific Purposes (ESP) in academic and professional English proficiency. General English develops reading, writing, listening, and speaking skills, giving students a solid linguistic foundation. In contrast, ESP is tailored to specific communicative needs in domains such as science, business, and medicine, with a focus on vocabulary and structures relevant to professional or academic contexts. The research analyzes instructional strategies, effectiveness, and challenges associated with implementing both approaches. Recommendations are provided to help educators effectively integrate General English and ESP, thereby enhancing learners' language competence for academic success and career preparedness.

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ABSTRAK

Studi ini membandingkan Bahasa Inggris Umum versus Bahasa Inggris untuk Tujuan Khusus (ESP) dalam hal kemahiran berbahasa Inggris di bidang akademik dan profesional. Bahasa Inggris Umum mengembangkan keterampilan membaca, menulis, mendengarkan, dan berbicara, memberikan siswa landasan linguistik yang kuat. Sebaliknya, ESP dirancang untuk memenuhi kebutuhan komunikasi spesifik dalam bidang tertentu, seperti bisnis, teknik, atau kedokteran, yang menekankan kosakata dan struktur bahasa yang relevan dengan konteks profesional. Studi ini menganalisis strategi pengajaran, efektivitas, dan tantangan implementasi kedua pendekatan, serta memberikan rekomendasi bagi pendidik untuk mengintegrasikan General English dan ESP secara optimal agar dapat meningkatkan kompetensi bahasa peserta didik sesuai tujuan akademik dan karier.

INTRODUCTION

English plays a crucial role in learning Chemistry, as it enables students to access scientific information and communicate scientific ideas effectively. As the primary language of science worldwide, English is essential for reading academic articles, textbooks, and research papers published internationally (Flowerdew & Wang, 2015). Proficiency in English also enables chemistry students to participate in global scientific discourse and collaborate with researchers from diverse countries, thereby contributing to scientific advancement (Hyland, 2006). Consequently, English competence is indispensable for chemistry students because it facilitates access to scientific knowledge and supports clear and accurate communication in the global scientific community.

Language helps in communication, understanding, and building scientific knowledge. Accuracy and precision are crucial in science, especially chemistry, thus proper language use helps students express, analyse, and link complicated topics (Lemke, 1990; Wellington & Osborne, 2001). Strong language skills, therefore, enable students to think scientifically, articulate their understanding clearly, and participate meaningfully in academic discourse. In response to these demands, increasing attention has been given to English for Specific Purposes (ESP), especially in STEM fields that require language instruction aligned with disciplinary content.

ESP focuses on teaching language in ways that align with learners' academic and professional needs, making learning more relevant, effective, and engaging (Basturkmen, 2010; Dudley-Evans & St John, 1998). By emphasizing field-specific terminology and communicative practices, ESP helps students develop confidence and competence in using language relevant to their discipline (Belcher, 2009). This integration of language and science abilities shows that higher education is realising the relevance of subject-oriented language instruction.

Previous studies have shown that students enrolled in ESP programs outperform those in General English courses in their handling of subject-related academic materials (Rahman, 2015). ESP has been found to enhance students' motivation and engagement by directly addressing their academic needs (Belcher, 2009). Moreover, numerous studies indicate a strong relationship between English proficiency and academic success in science subjects, including Chemistry (Zhang & Mi, 2010). Adequate English skills allow students to comprehend scientific texts, participate in academic discussions, and produce effective scientific writing (Chen & Flowerdew, 2018). ESP instruction also improves students' ability to understand technical and specialized texts by integrating language learning with subject-matter knowledge (Hyon, 2018; Anthony, 2018).

ESP has been shown to improve chemistry education, although empirical research is few, especially in poor countries where English is not the predominant language of teaching (Widodo, 2016; Afzali & Fakharzadeh, 2020). Furthermore, the effects of ESP education on Chemistry students' learning and academic achievement are unknown (Ravina, 2019). This lack of context-specific evidence highlights the need for further research to evaluate the effectiveness of ESP in Chemistry education.

Empirically, many chemistry students experience difficulties in understanding English textbooks and technical terminology, which can negatively affect their learning outcomes (Mahboob & Tilakaratna, 2012). The gap between General English instruction and discipline-specific language demands often makes it challenging for students to grasp complex chemistry concepts (Basturkmen, 2010). As a result, educational institutions are increasingly adopting ESP-based courses to support students' academic needs better (Hyland, 2016). The application of ESP in Chemistry education is therefore theoretically and empirically justified.

This study examines the efficacy of ESP in Chemistry learning using Hutchinson and Waters' (1987) ESP framework, the Language for Specific Purposes (LSP) method, and cognitive and linguistic theories of content-based education. The study examines whether ESP provides more appropriate language skills to help students understand chemistry concepts and compares General English and ESP education on Chemistry comprehension and academic performance. The results should show if ESP may bridge language learning and subject-specific understanding in chemistry teaching.

METODE PENELITIAN

This descriptive correlational study examined the association between English for Specific Purposes (ESP) and General English instruction and Chemistry students' academic achievement. This design was selected because it allows the analysis of relationships among variables without manipulation, thereby producing reliable and generalizable findings (Creswell, 2014; Sekaran & Bougie, 2016). By comparing ESP and General English instruction, the study aimed to identify patterns of effectiveness in supporting Chemistry learning.

The study included 70 English-enrolled chemistry students who had completed at least one semester. Purposive sampling was used to ensure that participants met research goals and represented the target population (Etikan, Musa, & Alkassim, 2016). To ensure participant diversity and study validity, demographic data were obtained.

Students' English ability and comprehension in chemistry were assessed using questionnaires, interviews, and listening exams (Ary, Jacobs, & Sorensen, 2010). The instruments were validated and reliable before use. The reliability analysis showed good

internal consistency with a Cronbach's alpha coefficient of 0.87 (Gliem & Gliem, 2003). Multiple tools provided objective measurement and deep qualitative insights.

The two-week data collection approach followed ethical norms, including informed consent from all participants and data confidentiality (Israel & Hay, 2006; Creswell, 2014).

Descriptive and inferential statistics identified trends and correlations in quantitative data (Field, 2018). To find patterns and insights in qualitative interview data, thematic coding was used (Braun & Clarke, 2006). Quantitative and qualitative evaluations allowed a complete comparison of ESP and General English instruction in Chemistry education.

RESULTS AND DISCUSSION

This study involved 70 respondents from three different classes in the Chemistry Education program, as well as several Chemistry students from other institutions. The research instrument consisted of 40 statements grouped into six main categories: Relevance of ESP and General English; Influence on Chemistry Concept Understanding; Academic and Professional Skills; Perceptions of Teaching and Learning Strategies; Academic Effectiveness and Impact; and Attitudes and Motivation towards ESP. All items used a 1–5 Likert scale. In addition to quantitative data, the study included qualitative data from in-depth interviews with three students from classes A, B, and C to provide a more comprehensive picture of the challenges encountered when using General English and ESP in Chemistry Education.

Table 1. Descriptive Statistics of Students' Challenges Across Three Dimensions

Category	Mean	Mode	Std. Dev	N	Min	Max	Dominant %
A.The Relevance of ESP and General English							
A1	3,44	3	0,79	70	1	5	61%
A2	3,42	3	0,9	70	1	5	53%
A3	3,42	3	0,8	70	1	5	61%
A4	3,49	3	0,8	70	1	5	59%
A5	3,51	3	0,79	70	1	5	54%
A6	3,31	3	0,86	70	1	5	60%
A7	3,46	3	0,86	70	1	5	53%
A8	3,42	3	0,84	70	1	5	56%
B. Effect on Understanding of Chemistry Concepts							
B9	3,44	3	0,79	70	1	5	57%
B10	3,5	3	0,82	70	1	5	50%
B11	3,34	3	0,84	70	1	5	56%
B12	3,6	3	0,85	70	1	5	47%
B13	3,3	3	0,84	70	1	5	60%
B14	3,48	3	0,87	70	1	5	51%
B15	3,39	3	0,88	70	1	5	59%
C. Academic and Professional Skills							
C16	3,33	3	0,87	70	1	5	56%
C17	3,49	3	0,81	70	1	5	50%
C18	3,41	3	0,92	70	1	5	54%
C19	3,43	3	0,82	70	1	5	53%
C20	3,48	3	0,81	70	1	5	63%

Relevance of ESP and General English

The findings reveal that students perceive ESP as significantly more relevant to their academic needs than General English. The mean scores, which range from 3.42 to 3.61, demonstrate a general tendency toward agreement with statements emphasizing the contextual value of ESP. The highest percentages, up to 61%, further indicate that a majority of students believe ESP helps them understand chemistry terminology more effectively. The consistently low standard deviations (0.79–0.89) indicate that these

perceptions are shared across respondents, suggesting a strong consensus. Overall, the data indicate that ESP is perceived as better aligned with the linguistic and conceptual demands of chemistry.

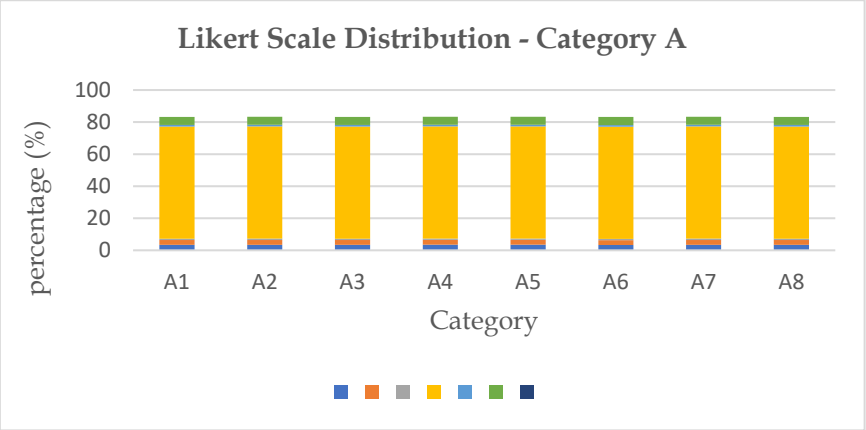

Chart 1. Relevance of ESP and General English

Effect on Understanding of Chemistry Concepts

ESP is also perceived as contributing positively to students' understanding of chemistry concepts. The mean values in this category range from 3.36 to 3.54, indicating that students generally agree that ESP supports their understanding of scientific content. Items with dominant percentages of 60%, particularly those related to communicating scientific ideas, suggest that ESP enhances not only comprehension but also the ability to articulate complex chemical concepts. The low standard deviations (0.79–0.88) again indicate consistent responses. These results suggest that ESP serves as an effective bridge between language learning and disciplinary understanding, helping students grasp challenging material through relevant linguistic frameworks.

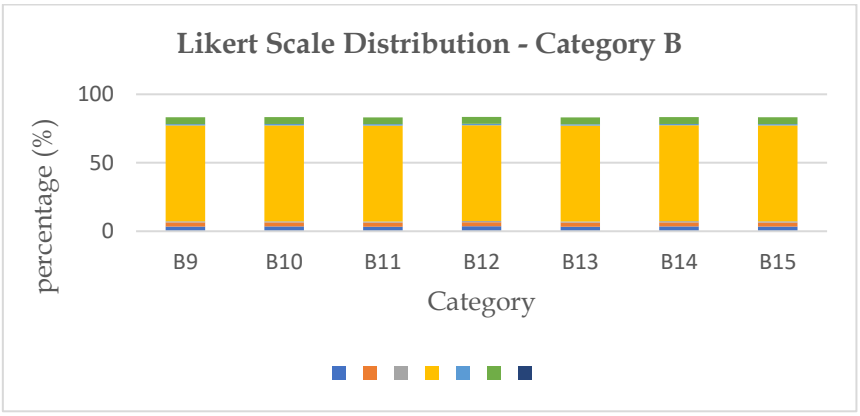

Chart 2. Effect on Understanding of Chemistry Concepts

Academic and Professional Skills

With respect to academic and professional readiness, the data indicate that ESP plays a significant role in preparing students for scientific communication. Mean scores ranging from 3.43 to 3.49 reflect agreement that ESP enhances skills such as reading scientific journals, writing academic reports, and presenting research findings. The highest dominant percentages in this category, 63% for items related to readiness for seminars and conferences, indicate that students feel more confident engaging in academic discourse after participating in ESP courses. The low standard deviations (0.81–0.88)

further confirm that these perceptions are widely shared. These findings emphasise the importance of ESP in teaching students worldwide academic and professional language skills.

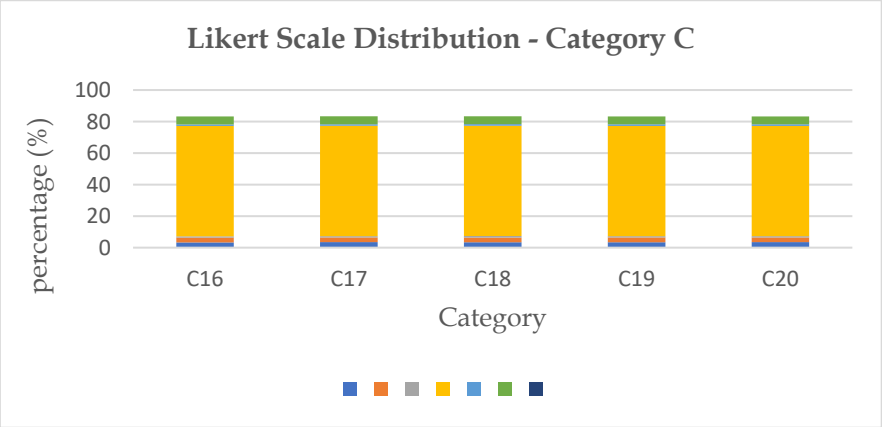

Chart 3. Academic and Professional Skills

Table 3.2 Descriptive Statistics of Students' Challenges Across Three Dimensions

Category	Mean	Mode	Std. Dev	N	Min	Max	Dominant %
D. Perceptions of Teaching and Learning Strategies							
D21	3,04	3	0,91	70	1	5	56%
D22	3,3	3	0,9	70	1	5	57%
D23	3,3	3	0,9	70	1	5	57%
D24	3,46	3	0,88	70	1	5	54%
D25	3,4	3	0,96	70	1	5	56%
D26	3,44	3	0,86	70	1	5	54%
E. Effectiveness and Academic Impact							
E27	3,45	3	0,9	70	1	5	53%
E28	3,34	3	0,81	70	1	5	57%
E29	3,33	3	0,89	70	1	5	57%
E30	3,41	3	0,64	70	1	5	63%
E31	3,57	3	0,85	70	1	5	54%
E32	3,51	3	0,86	70	1	5	56%
E33	3,52	3	0,87	70	1	5	51%
E34	3,53	3	0,77	70	1	5	56%
E35	3,47	3	0,86	70	1	5	56%
F. Attitudes and Motivation towards ESP							
F36	3,46	3	0,95	70	1	5	53%
F37	3,58	3	0,9	70	1	5	50%
F38	3,57	3	0,82	70	1	5	51%
F39	3,56	3	0,85	70	1	5	56%
F40	3,49	3	0,91	70	1	5	56%

Perceptions of Teaching and Learning Strategies

Students' perceptions of teaching and learning strategies show moderately positive trends. Mean scores range from 3.04 to 3.46, with item D21 recording the lowest mean (3.04), suggesting a more neutral stance. The mode for all items is 3, indicating that the most frequent response was neutral or slightly positive. Standard deviations between 0.82 and 0.96 reflect moderate variability in opinions.

Dominant percentages (54–57%) suggest that while a majority of students leaned toward agreement, the strength of consensus was modest. These results imply that although students generally view the teaching strategies favorably, enhancements in instructional clarity or engagement may be needed to elevate stronger agreement.

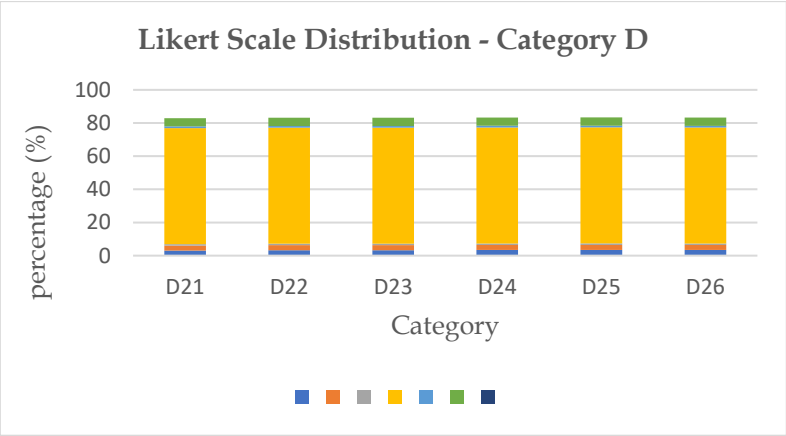

Chart 4. Perceptions of Teaching and Learning Strategies

Effectiveness and Academic Impact

This section reveals a more consistent and favorable evaluation of the ESP program's academic contributions. Mean scores span from 3.33 to 3.53, with item E33 achieving the highest mean (3.53), indicating a strong perceived academic benefit. The mode remains stable at three across all items, and standard deviations are slightly lower (0.64–0.91), suggesting tighter clustering of responses.

Item E30 stands out with the lowest standard deviation (0.64) and the highest dominant percentage (63%), reflecting strong consensus on its effectiveness. Items E31 to E35 have high mean values (≥3.47), supporting the conclusion that the ESP program positively influences academic performance. Overall, this dimension reflects solid endorsement and consistent satisfaction.

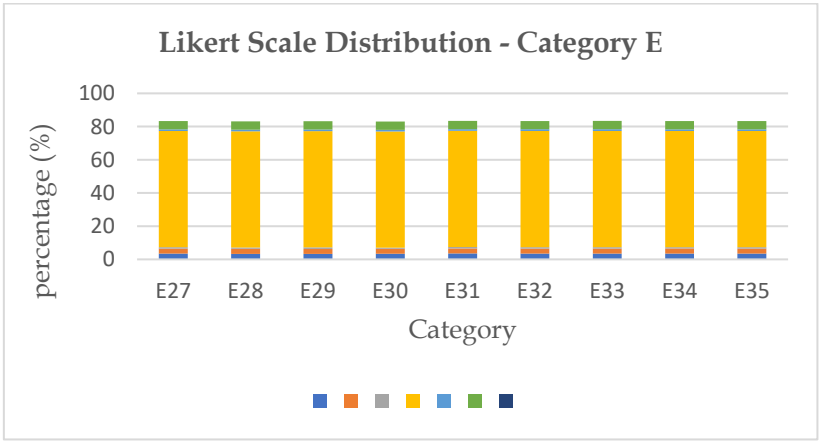

Chart 5. Effectiveness and Academic Impact

Attitudes and Motivation towards ESP

Students' attitudes and motivation toward ESP are generally positive, with mean scores ranging from 3.46 to 3.58. Item F37 records the highest mean (3.58), suggesting strong motivational engagement. However, dominant percentages are slightly lower (51–56%), indicating that although students report positive feelings, fewer selected the highest agreement options.

Items F38 and F39 exhibit the lowest dominant percentages (51%) despite relatively high means, which may indicate more evenly distributed responses or mixed motivational

intensity. Item F40, with a mean of 3.49 and a dominant percentage of 56%, reflects a balanced motivational response.

These findings suggest that students hold favorable attitudes toward ESP, though motivational strength varies and may benefit from targeted encouragement or personalization.

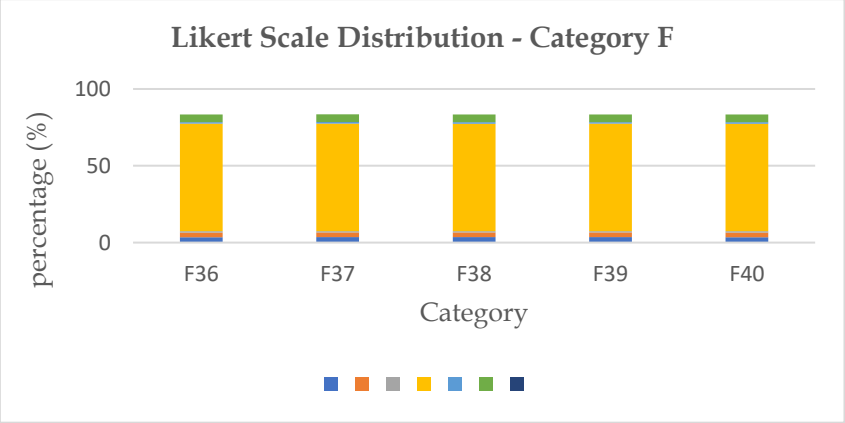

Chart 3.6 Attitudes and Motivation towards ESP

CONCLUSION

This study found that students view English for Specific Purposes (ESP) as moderately relevant and effective in academic and professional settings. In Section A, the relevance of ESP and General English received consistent mean scores around 3.4–3.5, with dominant percentages above 50%, indicating a positive but not overwhelming consensus. Section B shows that ESP contributes to students' understanding of chemistry concepts, with slightly lower mean scores and more varied dominant percentages, suggesting mixed perceptions. Section C highlights the role of ESP in developing academic and professional skills, with similar moderate scores and dominant percentages.

In Section D, teaching and learning strategies were viewed favorably, although mean scores were slightly lower, indicating room for pedagogical improvement. Section E demonstrates that ESP is considered effective and impactful academically, with the highest mean score (3.71) for item E30, indicating strong agreement regarding its influence. Lastly, Section F reflects students' attitudes and motivation towards ESP, with consistently positive scores and dominant percentages, affirming its motivational role in language learning.

Overall, the data suggest that while ESP is valued across multiple dimensions, its perceived effectiveness varies by context, highlighting the need for targeted enhancements in instructional strategies and curriculum alignment

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