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Survey of Students' Perceptions Toward Teacher Feedback in ESP Chemistry Courses

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Abstract

Teacher feedback plays a crucial role in supporting students' learning development, particularly in English for Specific Purposes (ESP) Chemistry, where learners must master both linguistic and scientific competencies. This study investigates Chemistry students' perceptions of teacher feedback, the types of feedback they consider most beneficial, and the influence of feedback on their motivation and engagement. Using a mixed-method design, quantitative data were collected from 100 undergraduate Chemistry students through a Likert-scale survey, while qualitative insights were obtained from interviews with 3–5 selected participants. Findings indicate that students generally hold positive perceptions of teacher feedback, valuing clarity, specificity, and constructive tone. They consider timely and detailed feedback particularly helpful for improving language accuracy, content comprehension, and academic performance. However, students also report inconsistency in feedback quality and a lack of follow-up explanations in some instances. The study highlights the need for balanced feedback addressing both linguistic and disciplinary aspects, and emphasizes the importance of teacher feedback literacy in ensuring effective and meaningful feedback practices. These findings provide insights for improving ESP Chemistry instruction and enhancing students' learning outcomes.

Keywords: *ESP Chemistry, Learning Motivation, Student Perception, Teacher Feedback.*

1. INTRODUCTION

Feedback plays a significant role in influencing students' learning outcomes by helping them recognize their strengths and areas that require improvement. Feedback from teachers has an important role in improving student learning outcomes in English for Specific Purposes (ESP) chemistry. Through proper feedback, students can recognize their mistakes and improve the quality of their assignments or academic performance. Thus, they can achieve better understanding and obtain more optimal academic achievement Appropriate and well-directed feedback can improve students' learning outcomes because it helps them recognize their mistakes and enhance their academic performance. Providing constructive feedback can enhance students' learning motivation by increasing their confidence and encouraging active engagement in the learning process. In addition to affecting learning outcomes, feedback also plays a role in increasing student motivation. Feedback that is positive and constructive can foster students' confidence to continue learning and improve their abilities.2 This makes students more active, excited and deeply involved in the learning process. Positive and constructive feedback can increase students' learning motivation by building their confidence and encouraging them to continue putting effort into their studies. Feedback contributes to students' development of conceptual understanding and language proficiency by guiding them to make corrections and refine their knowledge. Feedback also contributes to the understanding of chemical concepts in the English context. Through relevant explanations and corrections, students can understand scientific terminology as well as deeper conceptual meanings. In this way, they are able to connect their language knowledge with chemistry more effectively. Effective feedback can strengthen students' understanding of concepts and improve their language skills by clarifying misconceptions and correcting language use.

Previous studies

ESP students have specific preferences in learning English that are influenced by their academic fields, learning needs, and desired professional applications. ESP learners have shown higher motivation when the learning content is connected to real professional needs (Wang& Mei 2020).ESP students usually prefer learning materials that match the language used in their specific discipline(Hyland, 2023).ESP students benefit more when English learning materials are directly aligned with their specific academic and professional needs Students often perceive ESP courses as challenging due to specialized vocabulary, technical content, and the need to apply English in a specific professional context. Students often find ESP courses difficult because the terminology differs from general English (Arifin, 2020). Many learners are struggling to understand technical English texts required in their fields (Lee,2021). ESP courses can be challenging for students because they require understanding specialized vocabulary and technical concepts that differ from general English Learning Students' perceptions and readiness for bilingual learning vary depending on their language proficiency, confidence, and exposure to both languages in academic environments. Students show different levels of readiness depending on their exposure to bilingual environments (Alharbi, 2020). Some students are developing confidence as they participate more in bilingual classroom interactions (Zhang & Hyland, 2022). Students' readiness for bilingual learning varies based on their confidence, language proficiency, and level of exposure to bilingual educational environments.

Research on English for Specific Purposes (ESP) in the field of Chemistry remains limited, particularly in exploring students' perceptions and learning experiences. This limitation creates a gap in understanding how ESP instruction can be effectively tailored to meet students' discipline-specific academic needs. Recent scholars emphasize the importance of examining learner perspectives in subject-specific English contexts to ensure instructional relevance and effectiveness (Alharbi, 2020). However, most recent studies still focus on general ESP or English for Academic Purposes (EAP) contexts rather than Chemistry-specific ESP, resulting in a lack of specialized insight into students' learning experiences in scientific disciplines (Ramadhani, 2023). Therefore, expanding research in ESP Chemistry is essential, as understanding students' perceptions plays a crucial role in designing learning activities that align with their academic and professional needs. Furthermore, the influence of teacher feedback on students' motivation and academic achievement in ESP Chemistry courses has not been extensively investigated, despite the critical role of feedback in supporting students' understanding of both scientific content and language use. Recent studies in ESP and EFL contexts suggest that effective and constructive feedback positively affects students' engagement and learning motivation (Liu, Wang, & Mei, 2020). Indonesian studies also indicate that feedback contributes to improved learning outcomes and learner confidence in ESP classrooms (Arifin, 2020). Nevertheless, research specifically examining how teacher feedback influences motivation and performance in ESP Chemistry remains scarce, indicating the need for further investigation in this discipline-specific context. In addition, there is limited empirical evidence identifying which forms of teacher feedback students perceive as most beneficial in subject-specific English learning. Recent studies have explored various feedback modes, including written, oral, and technology-mediated feedback, to determine their effectiveness in ESP learning (Zhang & Hyland, 2022). Indonesian researchers have also begun examining students' perceptions of digital and corrective feedback in ESP writing classes (Rahmati, 2025). However, findings remain inconclusive, particularly regarding feedback practices that integrate linguistic correction with disciplinary content guidance in ESP Chemistry. Identifying the types of feedback that students find most useful is therefore essential for improving feedback practices and enhancing learning effectiveness in ESP courses, especially within science-based disciplines.

Empirical reasons

Chemistry students frequently encounter difficulties in understanding scientific English because they are required to simultaneously comprehend complex chemical concepts and specialized scientific terminology. Empirical studies indicate that ESP learners in science-related disciplines experience a dual cognitive load when processing both linguistic structures and disciplinary meanings. Alharbi (2020) states that *"students in science-based ESP courses face substantial cognitive challenges as they are required to process technical content and specialized language simultaneously."* Similarly, Perala &Sar Janiah (2025) confirm that *"ESP learners in scientific disciplines experience a dual cognitive load, as they must interpret disciplinary concepts while managing unfamiliar linguistic structures."* In addition, scientific terminology has been identified as a major obstacle in ESP learning because it differs significantly from everyday English. Ramadhani (2023) notes that *"scientific vocabulary poses a major obstacle for ESP learners because it is rarely encountered in everyday communication and requires contextualized academic understanding,"* while Fathallah (2024) report that *"students in science-related ESP classes struggle to comprehend texts due to the density of technical terms and discipline-specific expressions."* These empirical findings indicate that Chemistry students require targeted language support, as the dual demand of mastering scientific concepts and specialized terminology makes scientific English particularly challenging for them. Teacher feedback serves as a crucial bridge between content knowledge and language accuracy in ESP learning. Recent research demonstrates that effective feedback helps learners connect disciplinary understanding with appropriate linguistic forms. Wang& Mei (2020) argue that *"teacher feedback plays a mediating role between disciplinary understanding and linguistic accuracy, enabling learners to refine both meaning and form."* Lee (2021) emphasizes that *"feedback that integrates content explanation with language guidance helps students develop clearer and more accurate academic discourse."* Supporting this view, Zhang and Hyland (2022) found that *"feedback that combines linguistic correction with content-related explanation significantly enhances students' ability to communicate disciplinary knowledge accurately."* Evidence from Indonesian ESP contexts also supports this claim. Arifin (2020) reports that *"students perceive teacher feedback as a crucial source of guidance that improves clarity of expression and confidence in using English for academic purposes,"* while Supari (2024) concludes that *"constructive feedback in ESP classrooms contributes to students' confidence and their ability to express subject-specific ideas more accurately."* These findings confirm that teacher feedback is an essential component of ESP Chemistry instruction, as it enables students to accurately express scientific ideas through appropriate language use. Furthermore, classroom-based research indicates that students respond differently to teacher feedback in ESP Chemistry lessons due to variations in language proficiency, educational background, and individual learning needs. Han and Hyland (2023) explain that *"learners' responses to feedback vary depending on proficiency level, learning background, and individual needs,"* while Lee (2021) highlights that *"no single feedback strategy works equally for all learners."* Some students benefit more from detailed corrective feedback, whereas others show greater motivation when receiving supportive and motivational feedback. Liu(2020) note that *"students with lower confidence levels tend to respond more positively to supportive feedback, while higher-proficiency learners often benefit from explicit corrective feedback."* Indonesian research further reinforces this finding, as Rahmati (2025) report that *"the effectiveness of teacher feedback in ESP classrooms is highly dependent on instructional context and individual learner characteristics."* These empirical findings suggest that feedback strategies in ESP Chemistry classrooms should be adapted to students' individual learning preferences and instructional contexts to maximize their effectiveness.

Basic theories

Feedback theory explains that feedback plays an essential role in guiding students' learning progress by providing information that helps them understand their performance, identify errors, and make continuous improvements. Through feedback, teachers assist learners in developing better conceptual understanding, academic performance, motivation, and engagement in the learning process. Recent studies emphasize that feedback supports students' reflection on learning outcomes and encourages them to take corrective actions, leading to sustained improvement and higher achievement. Empirical evidence from both international and Indonesian contexts confirms that effective teacher feedback enhances learner engagement, confidence, and performance in language learning and ESP classrooms (Arifin, 2020; Haryanto, 2021; Lestari, 2025). Constructivist learning theory emphasizes that learners actively construct knowledge through experience, interaction, and reflection rather than passively receiving information from the teacher. Learning occurs when students link new information with their prior knowledge, allowing them to build deeper and more meaningful understanding. Recent educational research highlights that constructivist approaches promote active participation, critical thinking, and long-term retention of knowledge, particularly when learners are engaged in problem-solving and reflective activities. Studies conducted in both international and Indonesian educational settings demonstrate that students learn more effectively when they actively construct knowledge through experience and reflection (Ramadhan, 2024; Halid, 2024; Ahmadabad, 2025). English for Specific Purposes (ESP**)** theory states that English instruction should be designed according to learners' specific academic or professional needs, with language learning closely integrated with discipline-specific content. ESP instruction focuses on providing relevant and contextualized language input that aligns with students' fields of study, enabling them to develop practical communication skills for real academic and professional contexts. Recent ESP research shows that effective ESP instruction integrates language skills and subject-area knowledge to address learners' disciplinary demands and improve learning relevance. Studies from Indonesia and other contexts confirm that ESP pedagogy is most effective when English learning is closely connected to students' academic disciplines and professional goals, ensuring meaningful and applicable language use (Nutheti, 2020; Ananta, 2025; Sulaiman, 2024).

2. METHOD

Design

The study employs a mixed-methods research design**,** combining quantitative methods through surveys and qualitative approaches through interviews to obtain comprehensive and in-depth data. Mixed-methods research is considered effective because it allows researchers to integrate numerical findings with participants' perspectives, thereby enhancing the validity and depth of the research results (Creswell & Plano Clark, 2020). This approach helps bridge the gap between statistical trends and real learning experiences, enabling researchers to gain a more comprehensive understanding of complex educational phenomena. By integrating quantitative breadth and qualitative depth, mixed-methods research produces more holistic and meaningful findings in educational studies (Thakore, 2020).

Participants/Object

The study focuses on students enrolled in English for Specific Purposes (ESP) Chemistry courses, where English instruction is tailored to the academic and professional contexts of chemical sciences. Recent studies emphasize that discipline-specific ESP instruction helps learners meet the linguistic demands of scientific discourse and professional communication (Alharbi, 2020). The participants of this study are undergraduate students who are currently developing their academic and professional English competence to support their studies in chemistry. Undergraduate students are

considered appropriate participants in ESP research because they are actively developing academic language skills required in science-based disciplines (Lee, 2021).

Sample Size

The research was initially designed to involve 100 undergraduate students in the quantitative survey to obtain broad insights into students' perceptions of ESP Chemistry learning. Questionnaires are widely used in perception-based research because they allow researchers to collect measurable data efficiently from a large number of participants (Creswell & Plano Clark, 2018). However, 64 students completed and returned the questionnaire, and these responses were used as the primary dataset for quantitative analysis. Methodological studies suggest that response rates above 60% are acceptable for survey research and can still yield reliable and meaningful findings (Teredos, 2022).

Research Instrument

The research instrument employs a five-point Likert scale ranging from Strongly Disagree to Strongly Agree to measure respondents' perceptions or levels of agreement with the given statements. In sum, Data obtained from the Likert scale can be statistically analysed to identify trends, patterns, and overall respondent tendencies (Allen & Seaman, 2007). The five-point format provides a balanced range of options, making it easier to quantify attitudes or opinions (Boone & Boone, 2012). The five-point Likert scale effectively captures respondents' attitudes and levels of agreement toward the given statements. It provides quantifiable data that can be analysed statistically, ensuring both the reliability and validity of the research findings. Document analysis is conducted using an evaluation rubric applied to teacher feedback samples to assess the quality, consistency, and characteristics of the feedback provided. The rubric includes specific criteria such as clarity, relevance, tone, and constructiveness of feedback (Brookhart, 2017). Teacher feedback samples are examined to identify common themes and patterns in their written responses (Creswell & Path, 2018). Therefore, the document analysis rubric serves as a systematic and objective tool for evaluating teacher feedback samples. It enables the researcher to assess the quality, consistency, and characteristics of written feedback, contributing to a deeper understanding of teachers' feedback practices. As supporting data, a short questionnaire or interview may be used to gather additional information that strengthens the main findings from the document analysis. The questionnaire or interview includes concise questions focusing on teachers' perceptions and experiences related to their feedback practices (Dörnyei, 2007). Participants' responses provide deeper insight into the factors influencing the way feedback is given (Richards, 2009). The short questionnaire or interview functions as a supplementary data collection instrument that supports and enriches the primary findings. This additional method strengthens data triangulation and enhances the credibility and comprehensiveness of the overall research.

Data Collection Procedure

The process of data collection is carried out through several systematic steps to ensure the accuracy, consistency, and reliability of the research data. The researcher begins by preparing all necessary instruments, including questionnaires, rubrics, and interview guidelines (Fraenkel, Wallen, & Hyun, 2012). Next, a pilot test is conducted to verify the clarity and effectiveness of the instruments before actual use (Dörnyei, 2007). After the instruments are validated, data collection is implemented following the established procedures and ethical guidelines (Cohen, Manion, & Morrison, 2018). Finally, all collected data are organized and documented for further analysis to maintain the integrity of the research process (Miles, Huberman, & Saldaña, 2014). Conducting data collection through a series of systematic steps ensures the accuracy, reliability, and validity of the research process. Careful preparation, implementation, and documentation contribute to the integrity and transparency of the study, leading to credible findings. Before the actual data collection, a pilot test of the research instruments is conducted to evaluate their clarity, validity, and

reliability. Conducting a pilot test ensures that the instruments produce consistent and meaningful data during the main research phase (Cohen et al., 2018). Feedback from these participants helps the researcher identify ambiguous questions or potential issues within the instruments (Mackey & Gass, 2016). Pilot testing plays a crucial role in refining research instruments by identifying ambiguities and improving their validity and reliability. Through pilot testing, the researcher ensures that the instruments function effectively during the main data collection phase and yield consistent, meaningful result. The questionnaires are distributed to participants both online and offline to reach a wider range of respondents and facilitate effective data gathering. Online distribution is carried out using digital platforms such as Google Forms or email, allowing participants to respond conveniently (Wright, 2005).Offline distribution involves printed questionnaires administered directly to participants who have limited internet access (Creswell, 2012).The dual approach increases the response rate and ensures inclusivity across different participant groups (Fetters, Curry, & Creswell, 2013).Collected responses from both modes are compiled and coded systematically for further statistical analysis (Fraenkel et al., 2012).Combining online and offline distribution of questionnaires enhances the reach and inclusivity of the data collection process. This dual approach allows the researcher to gather comprehensive responses from diverse participants, improving the representativeness and generalizability of the findings. Interview participants are selected based on specific criteria relevant to the research objectives to obtain in-depth and representative qualitative data. The researcher identifies potential participants who have sufficient experience or knowledge related to the research topic (Creswell & Path, 2018).Selection is typically based on purposive sampling to ensure that participants can provide valuable insights (Eitan, Musa, & Akasia, 2016).Each selected participant is contacted in advance to obtain informed consent and schedule the interview (Merriam & Tisdell, 2016).This careful selection process helps ensure that the data gathered are credible, rich, and aligned with the research purpose (Lincoln & Guba, 1985).the careful selection of interview participants based on relevant criteria ensures the collection of rich, credible, and insightful qualitative data. This purposive approach enables the researcher to explore the research topic in depth and align the findings closely with the study's objectives.

Data Analyst

Quantitative data are analysed using descriptive statistical methods, including the calculation of mean, standard deviation, and percentage, to summarize and interpret participants' responses. Descriptive statistics are used to provide an overall summary of the data and show the tendency and variability of responses (Arik unto, 2013).The standard deviation helps describe the spread of the data around the mean, indicating how consistent the responses are (Santoso, 2014).Percentages are also calculated to identify the proportion of responses for each category, which helps in interpreting patterns clearly (Ridwan, 2015).Descriptive statistical analysis helps the researcher summarize, organize, and interpret numerical data clearly and systematically. By using mean, standard deviation, and percentage, the overall tendency and variation of participants' responses can be effectively described, ensuring that the data are accurately represented and easy to interpret. A correlation analysis is conducted to examine the relationship between participants' perceptions and their improvement levels, identifying whether a significant association exists between the two variables. Pearson's Product Moment correlation is commonly used to determine the strength and direction of the relationship between two quantitative variables (Ridwan & Suharto, 2016). This analysis helps explain how changes in participants' attitudes correspond to changes in their performance (Sugiyama, 2019). Correlation analysis provides valuable insight into the relationship between participants' perceptions and their improvement. The use of Pearson's Product Moment helps identify the strength and direction of this relationship, indicating whether perception has a significant influence on participants' progress Qualitative data are analysed through thematic analysis,

which involves coding, categorizing, and identifying emerging themes to interpret patterns and meanings within participants' responses. The researcher begins by reading the qualitative data repeatedly to understand its meaning and context (Gunawan, 2013). Thematic analysis helps the researcher interpret participants' experiences more deeply and connect them to the research objectives (Milelong, 2019). Thematic analysis enables the researcher to explore and interpret qualitative data in depth by identifying recurring patterns and central themes. Through systematic coding and categorization, the analysis produces meaningful insights that reflect participants' experiences and perspectives relevant to the research objectives Triangulation of data sources is employed to ensure the credibility and validity of the findings by comparing and integrating data from different instruments and perspectives. Triangulation is used to check the consistency of data obtained from various sources such as questionnaires, interviews, and document analysis (Milelong, 2019).This process increases the credibility and trustworthiness of qualitative findings (Gunawan, 2013).By comparing multiple data types, the researcher can identify convergences or discrepancies that support deeper interpretation (Sugiyama, 2019).Triangulation ensures that conclusions are not based on a single source, but supported by diverse and reliable evidence (Bungan, 2015).In sum, Triangulation of data sources enhances the credibility and validity of research findings by cross-verifying information from different instruments and perspectives. This process ensures that conclusions are well-supported by multiple data types, thereby strengthening the trustworthiness and accuracy of the overall study

Explaining research chronological, including research design, research procedure, how to test the data and data acquisition. The description of the course of research should be supported with references, so the explanation can be accepted scientifically. Tables and Figures are presented centre, as shown in Table 1 and Figure 1, and cited in the manuscript and should appeared before it.

Tabel 1. Question Difficulty Index Score

Category	Identifying Reading Purpose	Mean
Highest	The respondent with the highest score demonstrates a very positive perception of teacher feedback in the ESP Chemistry course. The student perceives the feedback as clear, relevant, and timely, and believes that it effectively enhances understanding of the subject matter, learning motivation, and confidence in using English within the context of chemistry. This finding indicates that teacher feedback plays a highly significant role in supporting effective learning in ESP Chemistry courses.	5,00

Category	Identifying Reading Purpose	Mean

Lowest	The respondent with the lowest score demonstrates a very negative perception of teacher feedback in the ESP Chemistry course. The student perceives that the feedback does not support understanding of the material, does not increase learning motivation, and does not contribute to the development of English language skills in the chemistry context. This result suggests a possible mismatch between the student's	1,00

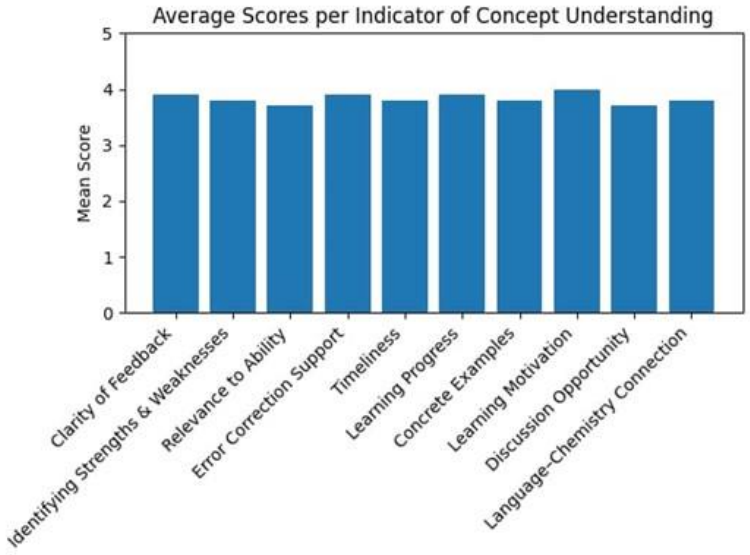

Fig 1. The average Values of Concept Understanding Ability

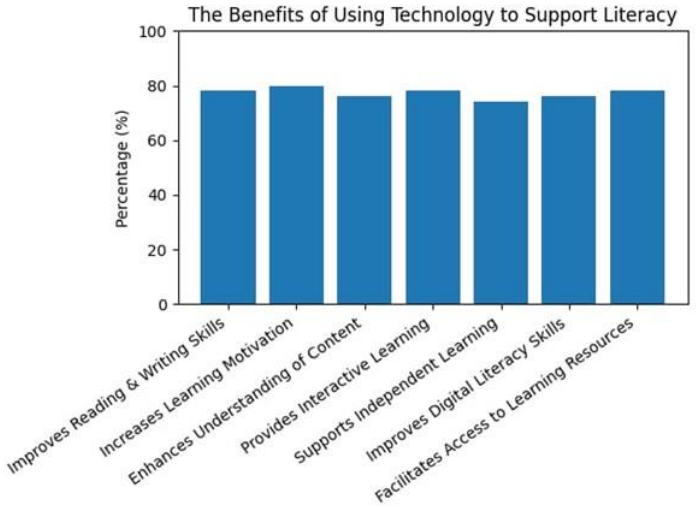

Fig 2. The Benefits of Using Technology to Support Literacy

3. RESULT

The findings of this study demonstrate that Chemistry students predominantly hold favourable perceptions of the teacher feedback provided in English for Specific Purposes (ESP) Chemistry courses. Students perceive teacher feedback as an essential instructional component that supports both their language development and their understanding of discipline-specific content. Feedback that is delivered clearly, specifically, and constructively is considered highly effective in helping students recognize their strengths and identify areas for improvement. Such feedback enables learners to better comprehend chemical concepts presented in English, refine their use of scientific terminology, and improve overall language accuracy and coherence in academic tasks. In addition, the results indicate that timely feedback plays a significant role in enhancing students' learning motivation and engagement. When feedback is provided promptly, students are more likely to reflect on their performance, revise their work meaningfully, and actively participate in subsequent learning activities. Students also report that feedback contributes to increased confidence in using English within the chemistry context, as it guides them in correcting linguistic errors while simultaneously deepening their conceptual understanding. This dual function of feedback helps bridge the gap between language learning and content mastery, which is a key challenge in ESP Chemistry instruction. Moreover, the study reveals that students particularly value feedback that integrates language-focused correction with clear explanations of chemical concepts. This type of integrated feedback allows learners to connect linguistic form with disciplinary meaning, thereby supporting more accurate and effective scientific communication. However, despite these generally positive perceptions, the findings also highlight several existing challenges. Some students report inconsistencies in the quality and depth of feedback across different assignments, as well as limited opportunities for follow-up clarification or discussion with instructors. These issues may reduce the overall effectiveness of feedback and hinder students' ability to fully apply the suggestions provided. Overall, the findings suggest that while teacher feedback is widely perceived as beneficial and influential in ESP Chemistry learning, its impact can be further strengthened through greater consistency, clearer guidance, and sustained follow-up practices. Enhancing these aspects of feedback delivery may contribute to more meaningful learning experiences, improved academic performance, and stronger motivation among Chemistry students in ESP contexts.

4. DISCUSSION

Students' Perceptions of Teacher Feedback in ESP Chemistry Learning

The results of this study indicate that Chemistry students generally hold positive perceptions of teacher feedback in English for Specific Purposes (ESP) Chemistry learning. This finding addresses the first research question concerning students' perceptions of the effectiveness of teacher feedback. Teacher feedback is viewed as an important component of the learning process because it helps students identify their strengths and weaknesses in both linguistic aspects and conceptual understanding of chemistry. This finding is consistent with feedback theory, which emphasizes that feedback functions as a guiding tool to improve learning processes, academic performance, and student engagement (Arifin, 2020; Haryanto, 2021). Students perceive that clear and relevant feedback enhances their understanding of ESP Chemistry materials, which require the integration of English language skills and scientific knowledge. Through feedback, students are able to reflect on their errors and make continuous improvements, leading to a more structured and meaningful learning process.

Types of Teacher Feedback Considered Most Beneficial

Based on the findings, the most beneficial type of teacher feedback perceived by students is feedback that is specific, constructive, and integrated, combining language

correction with explanations of chemical concepts. This finding responds to the second research question regarding the types of feedback that are most useful for improving students' performance in ESP Chemistry. Feedback that focuses solely on linguistic errors without content explanation is considered less effective, as students require a comprehensive understanding of both language and disciplinary content. This result supports the theory of English for Specific Purposes (ESP), which emphasizes that language instruction should be aligned with learners' academic and disciplinary needs. Integrating linguistic feedback with content-related explanations enables students to connect scientific terminology, sentence structures, and conceptual meaning, thereby enhancing their academic and scientific communication skills (Hyland, 2023; Nutheti, 2020).

The Influence of Teacher Feedback on Students' Motivation and Engagement

The findings also reveal that teacher feedback has a significant influence on students' motivation and engagement in ESP Chemistry learning. This addresses the third research question, which examines the impact of teacher feedback on students' motivation and learning engagement. Timely feedback encourages students to revise their work, improve learning outcomes, and participate more actively in the learning process. This finding aligns with constructivist learning theory, which posits that learning is most effective when students actively construct knowledge through reflection and experience. Teacher feedback serves as a reflective stimulus that helps students evaluate their learning process and promotes deeper engagement in ESP Chemistry learning (Ramadhan, 2024; Halid, 2024).

Challenges in Implementing Teacher Feedback in ESP Chemistry Classes

Despite the generally positive perceptions, this study also identifies several challenges in the implementation of teacher feedback. Some students report inconsistencies in the quality of feedback across assignments and limited opportunities for follow-up clarification or discussion with instructors. These challenges may hinder students' ability to fully understand and apply the feedback provided. These findings suggest that the effectiveness of feedback is influenced not only by its content but also by its consistency and sustainability. This is consistent with previous studies indicating that students' responses to feedback vary depending on learning context, individual characteristics, and instructional strategies employed by teachers (Han & Hyland, 2023; Rahmati, 2025).

5. CONCLUSION

This study was conducted to address the objectives outlined in the Introduction, namely to examine Chemistry students' perceptions of the effectiveness of teacher feedback in English for Specific Purposes (ESP) Chemistry learning, to identify the types of feedback considered most beneficial, and to analyse the influence of teacher feedback on students' motivation and engagement. Based on the research findings and discussion, it can be concluded that the research objectives have been successfully achieved, demonstrating clear alignment between the background of the study, the empirical findings, and the discussion. The findings indicate that Chemistry students generally hold positive perceptions of teacher feedback in ESP Chemistry learning. Clear, specific, constructive, and timely feedback is proven to support students' understanding of chemical concepts, improve accuracy in academic English use, and strengthen students' confidence in expressing scientific ideas. In addition, feedback that integrates linguistic correction with explanations of chemistry content is perceived as the most effective type of feedback in helping students achieve the intended learning objectives. The results also demonstrate that teacher feedback plays an important role in enhancing students' motivation and engagement in ESP Chemistry learning. Consistent feedback encourages students to become more reflective, active, and responsible for their own learning processes. Thus, the findings of this study reinforce the initial assumptions presented in the Introduction that teacher feedback is a strategic component of ESP instruction, particularly in science-based disciplines that require the simultaneous mastery of language and content. As a prospect

for further development, the results of this study may serve as a foundation for ESP Chemistry instructors to improve the quality and consistency of their feedback practices, both in face-to-face instruction and through the integration of educational technology. Future research is recommended to explore more dialogic and technology-mediated feedback models, involve larger participant samples, or extend the investigation to other science-related disciplines. Such future studies are expected to broaden understanding of effective and applicable teacher feedback strategies in supporting sustainable ESP learning.

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