DIKSI: Jurnal Kajian Pendidikan dan Sosial
p-ISSN: 2809-3585, e-ISSN: 2809-3593
Volume 6, nomor 4, 2025, hal. 1040-1050
Doi: https://doi.org/10.53299/diksi.v6i4.3484

Perceptions of the Importance of English in Physics Teaching Careers: A Survey

Siti Sarah, Nurul Azri Maghfirah, Wahyunengsih*
Universitas Islam Negeri Syarif Hidayatullah Jakarta, South Tangerang, Indonesia

*Coresponding Author: wahyu.nengsih@uinjkt.ac.id

Article history
Dikirim:
17-12-2025

Direvisi:
30-12-2025

Diterima:
31-12-2025

Key words:
Physics Education; Professional Development; Teacher Perceptions

Abstract: Since English improves academic communication, facilitates access to worldwide scientific sources, and supports professional development in international contexts, it has become an essential skill in physics education. Finding out how physics instructors and students perceive the importance of English in physics education and professional growth is the aim of this study. Forty-eight physics education students and 27 physics teachers participated in a quantitative survey. A validated survey with 50 Likert-scale items (Cronbach's Alpha = 0.84) was used to gather the results. Statistical methods that were both descriptive and inferential were used. The findings show that both groups had favorable opinions of English's involvement, with physics teachers indicating greater levels of perceived importance (M = 4.38) than students (M = 3.98). Professional communication, career advancement, and access to global scientific information were among the main perceived advantages. However, problems with qualified English language training and institutional assistance continued. The study concludes that, while taking local contexts into consideration, institutional strategies should support English literacy as a critical component of physics education.

INTRODUCTION

It plays a leading role in physics education today in allowing access to international scientific knowledge, academic communication, and professional collaboration. Since it is the leading language of scientific journals, conferences, and international research networks, it enables physics teachers and students to access relevant literature, take part in the scholarly conversation, and collaborate on research projects with other researchers beyond institutional or national limits. As a result, English language proficiency is increasingly being acknowledged as a critical skill that is closely related to career performance, professional development, and academic success in scientific domains (Kawakibi & Indrawan, 2024; Oliveira & Weinburgh, 2017; Qamariah & Yuliani, 2024). Akther (2022), Farrell TSC (2015), Kurniawan (2024), Naka & Spahija (2022) have all looked at this subject in a similar way.

Despite this growing recognition, the use of English in physics education remains uneven, particularly in english as a foreign language (EFL) contexts. According to Costa & Mariotti (2023) and Banegas (2017), most physics professors and students have a harder time communicating in English for academic and pedagogical objectives because of their lack of exposure, lack of institutional support, and poor confidence. These, in turn, generally result in various pedagogical

compromises, such as simplification of physics content, code-switching, limited interaction within the classroom, and limited participation in international academic practices in general (Hynninen, 2025). Far from being a global language of science, English is thus not yet equally available or effectively used even within physics education.

Previous studies have demonstrated that teachers' English proficiency significantly influences instructional quality, classroom communication, and access to academic resources. Consequently, higher levels of proficiency in English will be reflected, for instance, in the degree to which the teacher updates pedagogical materials, explains complex scientific content more articulatedly, and is more actively engaging in professional learning communities on behalf of their students (Ameen, 2024; Yong-bi, 2003). When supported by a high degree of language proficiency, innovative teaching strategies that combine language and content, like the method known as Content and Language Integrated Learning (CLIL), also have the benefits of increasing student motivation, deepening their conceptual insights, and fostering intercultural awareness (Sula et al., 2024). However, such measures are invariably constrained in science classes by insufficient vocabulary, lack of liaison between subject and language teachers, and lack of systematic professional development (Metlí & Akıs, 2022; Sarifa & Jabeen, 2024).

Apart from linguistic skills, teachers' perceptions, attitudes, and motivation toward English are basic in shaping instructional practices and professional engagement. Some scholars from the camps of teacher beliefs have pointed out that positive attitude and strong self-efficacy enhance the actual use of English in teaching and learning, while negative feelings and low degrees of confidence create instructional barriers (Aimah et al., 2020; Eragamreddy, 2024; Song & Su, 2025). From the perspective of professional development and the theory of global competence, Vargas et al., 2024; Haryadi & Aminuddin, 2023; Zhong M. A, 2020 stated that such a high level of English competence turns teachers into lifelong learners adapted to continuous change and valuable contributors to the international academic community. However, it is still uncommon to find studies on how English competence works in a physics teaching career from a discipline-specific perspective, especially regarding teachers' participation in global scientific communities, such as those cited by Kersting et al., (2024); Zeidan et al., (2023).

Furthermore, institutional and training-related factors continue to shape teachers' ability to develop and utilise English effectively. Lack of professional development opportunities, resource constraints, and weak institutional commitment have been shown to limit the level of confidence and competence of teachers to use English as a medium of instruction for scientific communication in developing country contexts (Indarti et al., 2023; Romios & Rajendra, 2025; Saud, 2025). These structural constraints highlight the need for sustained institutional support to ensure that English proficiency development aligns with the demands of globalised science education.

Given this, the aim of this research is to systematically examine the ways in which pre-service physics education students and in-service physics teachers view the importance of English, with a focus on the institutional contexts, work experiences, and motivating factors that shape these views. Specifically, the study seeks to identify perceived benefits, challenges, and expectations related to English

competence in the context of physics teaching careers and professional development. The lack of discipline-specific empirical data comparing attitudes at various levels of the physics teaching profession, especially in EFL environments where exposure to academic English and institutional support are still unequal makes this study urgent. This research highlights the significance of English proficiency in promoting successful teaching, career progression, and participation in global scientific and educational communities. It also offers a comprehensive knowledge of how English proficiency is positioned throughout professional development routes. Both in-service and pre-service instructors are included.

RESEARCH METHOD

Research Design

This research uses a quantitative descriptive survey approach to investigate how pre-service physics education students and in-service physics instructors see the value of English. This approach was chosen since the study's objective is to characterize and contrast current perception patterns rather than look into intervention effects or causal linkages. Descriptive surveys are appropriate for methodically gathering views and trends within a population, according to Creswell, (2012). This method offers more comparability and generalizability than qualitative techniques and permits a greater population coverage without changing the instructional environments in comparison to experimental designs. According to Cohen et al., (2017), the use of a standardized, closed-ended questionnaire guarantees dependability, reduces researcher bias, and permits accurate statistical analysis. This strategy is methodologically suited for the goals of this study since it has been successfully used in previous perception-based research in education (Putri, 2025; Zulaiha, 2023).

Research Participants

Pre-service physics education students and in-service physics instructors were the two participant groups in the research, which was carried out within the framework of physics education. 48 pre-service teachers and 27 working physics instructors who were chosen via purposive selection to reflect various levels of professional growth made up the study's total of 75 respondents. Participants were selected from both school-based teaching environments and university-based teacher education programs. Participants had to have prior experience using English in academic or professional contexts, be actively engaged in physics education, and participate freely in order to meet the inclusion requirements. Participant writing made it possible to compare impressions formed via academic preparation and classroom practice in a meaningful way, offering insights into the function of English in physics education and professional development.

Research Instruments

The study employed a structured, closed-ended questionnaire using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). The instrument consisted of 50 items organized into five constructs: Awareness of English as a Global Scientific Language, Perceived Professional Advantages, Future Teaching Readiness, Perceived Educational Impact, and Institutional and Future Support Perception. The

questionnaire was adapted and synthesized from established theoretical frameworks proposed by experts in English for Specific Purposes (ESP), applied linguistics, scientific communication, and teacher professional development, ensuring strong theoretical grounding. These constructs were designed to capture respondents' perceptions of the importance of English in physics teaching, its relevance for professional development, and challenges in educational contexts. The instrument underwent expert judgment for content validity, followed by a pilot test to ensure clarity and readability. Reliability analysis using Cronbach's Alpha indicated excellent internal consistency across all constructs, with alpha coefficients ranging from 0.921 to 0.959, exceeding the recommended threshold of 0.70 (Cohen et al., 2017; Creswell, 2012).

Data Collection

Data was collected using a Google Form-based closed online survey. The link to the survey was sent via institutional communication channels, including WhatsApp groups, to physics professors and physics education students. Accessibility was ensured by allowing respondents to finish the survey on their own devices. Throughout the data collecting period, response activity was tracked, and in order to boost the response rate, follow-up reminders were issued to non-respondents. To make data administration easier, all replies were automatically entered into a spreadsheet.

In order to guarantee adherence to the inclusion criteria, a methodical data cleaning procedure was carried out after data collection. This included eliminating unnecessary and inadequate replies as well as verifying the consistency of the answers. Only genuine and comprehensive answers were kept for analysis. The data were cleaned, coded using a five-point Likert scale, and then imported into SPSS and Excel for statistical analysis. All constructs showed extremely good internal consistency ($\alpha > 0.90$) according to reliability testing using Cronbach's Alpha prior to the main analysis, suggesting that the data were appropriate for quantitative analysis.

Data Analysis Technique

Quantitative procedures were employed to analyze the data in accordance with the descriptive survey design. All responses were first examined for completeness, accuracy, and consistency. After being numerically coded, the Likert-scale answers were examined using descriptive statistics, such as means, standard deviations, percentages, and frequency distributions, to find general trends in opinions on the significance of English in physics teaching professions. Group-based descriptive comparisons were conducted to examine differences in perceptual tendencies between in-service physics teachers and pre-service physics education students. These analytical techniques enabled a legitimate interpretation of the advantages, difficulties, and expectations related to English competence and gave a clear empirical picture of how English ability is seen throughout several professional development stages in physics education.

RESULTS AND DISCUSSION

Results

75 respondents in all, including 27 in-service physics instructors and 48 pre-service physics education students from different educational levels, participated in this research. 50 Likert-scale questions from a standardized questionnaire were used to gather data. The study used descriptive analysis to investigate the participants' opinions on the significance of English in physics teaching professions.

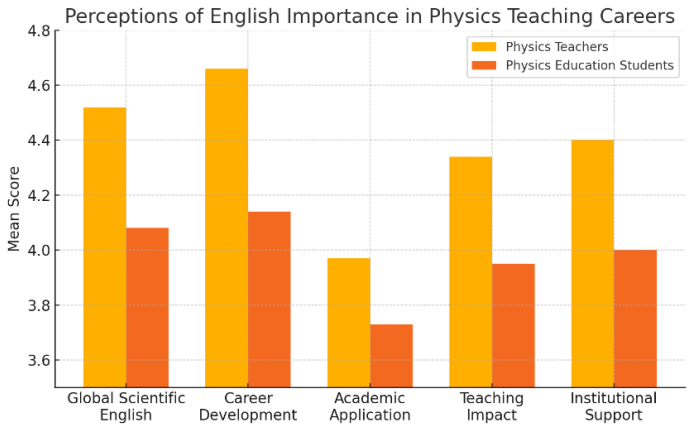
Prior to the main analysis, the research instrument was tested for validity and reliability. Expert judgment confirmed content validity, even though empirical validity testing showed that all items satisfied the minimum item–total correlation criterion ($r > 0.227$, $N = 75$, $\alpha = 0.05$). With alpha values ranging from 0.921 to 0.959 and above the suggested minimum value of 0.70, a reliability study using Cronbach's Alpha revealed high internal consistency across the five constructs.

The overall descriptive findings show that the function of English in physics instruction and professional development was positively viewed by both physics instructors and students studying physics education. All evaluation components had mean values in the high to very high range, suggesting that respondents strongly agreed that English is crucial to physics instruction.

Table 1. Mean Values for Each Assessment Aspect (Teachers and Students)

Assessment Aspect	Physics Teachers (Mean)	Teacher Category	Physics Education Students (Mean)	Student Category
Global Scientific Application	4.52	Very High	4.08	High
English Career	4.66	Very High	4.14	High
Development Academic	3.97	High	3.73	High
Teaching Impact	4.34	Very High	3.95	High

In all five evaluation categories, Global Scientific Application, English Career Development, Academic Application, Teaching Impact, and Institutional Support, physics instructors consistently reported better mean scores than physics education students, as shown in Table 1. Among teachers, English Career Development got the greatest mean score (M = 4.66, Very High), while Academic Application had the lowest (M = 3.97, High). All of the pupils' mean scores, which ranged from 3.73 to 4.14, were categorized as high.



Picture 1. Graph Mean Values

The comparison of mean scores between physics instructors and physics education students is further shown in Figure 1. The numerical trend in Table 1 is supported by the graphical depiction, which shows that instructors consistently had greater views of all evaluation elements, with English Career Development showing the biggest difference.

Discussion

The discussion is framed around the descriptive patterns observed in the survey results and interpreted in relation to established theoretical perspectives. With consistently stronger views provided by instructors across all evaluation areas, the study's results show that both pre-service physics education students and in-service physics teachers see English as a crucial component of physics teaching careers. This pattern indicates that professional experience strengthens awareness of English as a functional and strategic competence rather than merely an academic requirement.

The idea that English is a common scientific language is supported by the higher mean scores that instructors reported in respect to Global Scientific Application. Teachers' perception that English is the primary language of scientific knowledge worldwide is strengthened by frequent exposure to English-based scientific literature, educational resources, and professional communication. According to Luczaj et al., (2022); Navarro et al., (2022), who argue that English makes it easier to access international research networks and the cross-linguistic interchange of scientific knowledge, this finding supports the notion that English is a lingua franca in science. Students' positive but comparatively lower perceptions reflect their reliance on structured academic exposure rather than direct professional engagement.

Perceptions of English Career Development were shown to be the highest, particularly among in-service teachers. According to theories of professional growth, proficiency in the English language is essential for career progress, international cooperation, and professional mobility (Fernandes et al., 2023; Gu et al., 2025; Murray et al., 2024). These ideas are supported by this result. Teachers' increased awareness is a reflection of their experiences with career-related demands, including involvement in professional networks, research projects, and institutional activities that need a greater level of English proficiency. Despite their favorable attitudes, pre-service teachers seem to perceive English mostly as a future need, suggesting an early level of professional awareness.

Both groups recognized the importance of English in facilitating access to current scientific knowledge and conceptual comprehension in terms of academic development. Teachers' somewhat better scores could be explained by their increased reliance on physics materials and academic papers published in English. Although they acknowledge its significance, students' perspectives show that academic freedom in the use of English for academic purposes is still developing. It implies a moment of transition between individual academic engagement and guided learning.

According to Teaching Impact research, instructors believe that English helps them explain scientific ideas more clearly, provide higher-quality education, and communicate professionally. Research on CLIL and EMI supports these views, showing that when done correctly, adding English to science classes may help students learn new concepts and enhance their language skills (Kim & Graham, 2022; Lap et al., 2025; Querol-Julián, 2025; Villabona & Cenoz, 2022). Students'

lower scores in this aspect may reflect their limited teaching experience and reduced exposure to pedagogical practices that integrate English in classroom instruction.

The sense of English proficiency is influenced by a number of contextual factors, one of which is institutional support. Teachers who scored better on average may have more access to workshops, professional development, and English-based institutional resources. However, the positive yet lower perceptions among students indicate the need for stronger institutional and curricular support to prepare future teachers for English-mediated teaching contexts. This conclusion is consistent with more general issues in bilingual education and language policy, where a lack of training and unequal institutional support may make it difficult to successfully implement EMI and lead to learning disparities (Pun et al., 2025; Scherzinger & Brahm, 2023).

The aggregate findings clearly show that English is useful for teaching physics, although diverse theoretical perspectives say that it shouldn't be accepted without question. According to the Local Language Relevance Theory (Nakamura et al., 2023; Sultana & Fang, 2024; van Pinxteren, 2023), an excessive focus on English might lead to the marginalization of regional languages and a decrease in inclusion. These perspectives advocate combining English integration with teaching understanding of regional language contexts.

Overall, the combined results show that proficiency in English serves as a strategic advantage in physics education, promoting professional growth, worldwide scientific involvement, and successful teaching. While pre-service teachers' positive but lower impressions point to a developmental period that need for ongoing institutional and curriculum support, in-service teachers' higher perceptions reflect the challenges of their real-world jobs. This agreement between empirical evidence and recognized theoretical perspectives supports the notion that English proficiency is not simply a language skill but also an essential component of career trajectories in physics education.

CONCLUSION

The study reported here investigates the perceptions about the role of English in physics education and professional development, and factors influencing such perceptions held by a cohort of physics teachers and pre-service teachers. Overall, the results suggest that English is viewed as an important constituent of science education that underpins instructional practices and professional development. Participants in both groups strongly agreed that proficiency in English is important for effective teaching, for obtaining scientific knowledge, and in joining the international academic community. Quantitative results gave a consistently high score in perception statements, with a slightly higher value among in-service teachers, probably caused by their direct experience of using English in teaching, communication, and career-related activity.

Despite such positive attitudes, a number of issues still remain; namely institutional support is limited, training in the English language itself is inadequate, and a lack of confidence in classroom use impedes effective integration of English into physics teaching. These challenges point to structural and contextual limitations that must be addressed in order to consolidate more solidly English use within disciplinary teaching. Whereas the pre-service teachers expressed motivation and

conceptual awareness, the in-service teachers highlighted the importance of practical support and continuous professional development that would be in line with physics education. Generally, the study affirms that English proficiency is not only a means of communication but a professional competence as well, enabling the teacher to engage in global scientific exchange and to enrich the quality of physics education. Yet, any effort towards integrating English should be sensitive to local linguistic contexts, given that equitable implementation is meaningful only within such a context.

ACKNOWLEDGEMENTS

Authors would like to acknowledge Physics Education Department, participating schools and all Physics teachers and pre-service physics education students for their support and participation in this study. The authors wish to extend special appreciation to Mrs. Wahyunengsih for her guidance and language assistance during instrument development and manuscript preparation.

REFERENCES

Aimah, S., Rukmini, D., Saleh, M., & Bharati, D. (2020). *Pre-Service English Teachers' Beliefs about Teaching and Learning English in Microteaching Guided by an Expert Secondary English Teacher*. https://doi.org/10.4108/eai.29-6-2019.2290365

Akther, F. (2022). English for personal and career development and its importance for better employment opportunities. *Journal of Languages, Linguistics and Literary Studies*, *2*(3), 95–100. https://doi.org/10.57040/jllls.v2i3.258

Ameen, B. J. (2024). English in Science Education Significantly Enhances Student Achievement in Iraq. *Indonesian Journal of Education Methods Development*, *19*(3). https://doi.org/10.21070/ijemd.v19i3.838

Cohen, L., Manion, L., & Morrison, K. (2017). *Research Methods in Education*. Routledge. https://doi.org/10.4324/9781315456539

Costa, F., & Mariotti, C. (2023). *Input in English-Medium Instruction*. Routledge. https://doi.org/10.4324/9781003258407

Creswell, J. W. (2012). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research (4th ed)*. Pearson.

Criollo Vargas, M. I., González Criollo, M. J., & Cueva Criollo, E. J. (2024). Competencias complementarias del desempeño docente en la era global: Liderazgo, Desarrollo Profesional, Compromiso Ético y Vocación. *Revista Multidisciplinaria Investigación Contemporánea*, *2*(2), 23–45. https://doi.org/10.58995/redlic.rmic.v2.n2.a69

Eragamreddy, N. (2024). MOTIVATION AND AFFECTIVE FACTORS TO LEARN ENGLISH AS SECOND LANGUAGE. *Premise: Journal of English Education*, *13*(2), 409. https://doi.org/10.24127/pj.v13i2.9629

Farrell TSC (Ed.). (2015). *International Perspectives on English Language Teacher Education: Innovations from the Field*. Palgrave Macmillan.

Fernandes, S., Araújo, A. M., Miguel, I., & Abelha, M. (2023). Teacher Professional Development in Higher Education: The Impact of Pedagogical Training Perceived by Teachers. *Education Sciences*, *13*(3), 309. https://doi.org/10.3390/educsci13030309

Gu, Y., He, J., Huang, W., & Sun, B. (2025). Professional Development for Teachers in the Digital Age: A Comparative Analysis of Online Training Programs and Policy Implementation. *Behavioral Sciences*, *15*(8), 1076. https://doi.org/10.3390/bs15081076

Haryadi, R. N., & Aminuddin, M. (2023). The Role of English in Preparing Students to Face Global Challenges. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *6*(11), 9615–9621. https://doi.org/10.54371/jiip.v6i11.3167

Hynninen, N. (2025). English as a Lingua Franca and Academic Communication. In *The Wiley Blackwell Encyclopedia of World Englishes* (pp. 1–10). Wiley. https://doi.org/10.1002/9781119518297.eowe00102

I Wy Ana Kurniawan. (2024). English Language and Its Importance as Global Communication. *Samā Jiva Jnānam (International Journal of Social Studies)*, *2*(1), 51–57. https://doi.org/10.25078/ijoss.v2i1.3920

Indarti, L., Saud, U. S., Yuniarsih, T., & Nurdin, D. (2023). The Online Training on English for Teaching Science for Primary and Secondary School Teachers. *Dinamisia : Jurnal Pengabdian Kepada Masyarakat*, *7*(4), 1065–1071. https://doi.org/10.31849/dinamisia.v7i4.15529

Kawakibi, M. A., & Indrawan, F. (2024). Importance of English in International Science Research Collaboration. *Teaching English as Foreign Language, Literature and Linguistics*, *4*(1), 40–44. https://doi.org/10.33752/teflics.v4i1.6544

Kersting, M., Blair, D., Sandrelli, S., Sherson, J., & Woithe, J. (2024). Making an IMPRESSion: mapping out future directions in modern physics education. *Physics Education*, *59*(1), 015501. https://doi.org/10.1088/1361-6552/ad11e8

Kim, H., & Graham, K. M. (2022). Teachers' Needs and Professional Development: A Systematic Review. *Latin American Journal of Content & Language Integrated Learning*, *15*(1), 1–22. https://doi.org/10.5294/laclil.2022.15.1.5

Lap, T. Q., Tuong Vy, P. N., My Hanh, N. T., Tuan, L. C., & Hung, N. T. (2025). Toward the Content Language Integrated Learning (CLIL) Shift: What are EFL Teachers' Understandings, Practices, and Needs? *SAGE Open*, *15*(3). https://doi.org/10.1177/21582440251363336

Luczaj, K., Leonowicz-Bukala, I., & Kurek-Ochmanska, O. (2022). English as a lingua franca? The limits of everyday English-language communication in Polish academia. *English for Specific Purposes*, *66*, 3–16. https://doi.org/10.1016/j.esp.2021.11.002

Luis Banegas, D. (2017). *Initial English Language Teacher Education*. Bloomsbury Publishing Plc. https://doi.org/10.5040/9781474294430

Metlí, A., & Akıs, D. (2022). Challenges and Strategies on the Content and Language Integrated Learning Approach (CLIL): A Case Study from the Turkish Context. *Latin American Journal of Content & Language Integrated Learning*, *15*(1), 1–27. https://doi.org/10.5294/laclil.2022.15.1.4

Murray, E., Leonard, H. S., & Bonaccorso, V. D. (2024). Teacher Growth Through Professional Development Centered on the Teaching for Robust Understanding Framework. *Education Sciences*, *15*(1), 18. https://doi.org/10.3390/educsci15010018

Naka, L., & Spahija, D. (2022). Impact of English language as a human capital in the higher education institutions' development strategy. *Corporate and Business Strategy Review*, *3*(2, special issue), 262–272. https://doi.org/10.22495/cbsrv3i2siart7

Nakamura, P., Molotsky, A., Zarzur, R. C., Ranjit, V., Haddad, Y., & De Hoop, T. (2023). Language of instruction in schools in low- and middle-income countries: A systematic review. *Campbell Systematic Reviews*, *19*(4). https://doi.org/10.1002/cl2.1351

Navarro, F., Lillis, T., Donahue, T., Curry, M. J., Reyes, N. Á., Gustafsson, M., Zavala, V., Lauría, D., Lukin, A., McKinney, C., Feng, H., & Motta-Roth, D. (2022). Rethinking English as a lingua franca in scientific-academic contexts. *Journal of English for Research Publication Purposes*, *3*(1), 143–153. https://doi.org/10.1075/jerpp.21012.nav

Oliveira, A. W., & Weinburgh, M. H. (Eds.). (2017). *Science Teacher Preparation in Content-Based Second Language Acquisition*. Springer International Publishing. https://doi.org/10.1007/978-3-319-43516-9

Pun, J. K. H., Flowerdew, J., & Jia, W. (2025). Navigating Academic Language in English Medium Instruction (EMI) Science Classrooms in Hong Kong. *RELC Journal*, *56*(3), 573–589. https://doi.org/10.1177/00336882241261041

Putri, A. (2025). Investigating EMI practices in Indonesian science classrooms. *Journal of English Language Education*, *12*(1), 45–59.

Querol-Julián, M. (2025). CLIL teacher online professional development in translanguaging and trans-semiotizing: a pedagogy of multiliteracies. *Journal of Multilingual and Multicultural Development*, *46*(5), 1493–1509. https://doi.org/10.1080/01434632.2024.2352157

Romios, L., & Daffa Arief Rajendra. (2025). TOEFL Training and Professional Growth: Perceptions from Senior High School Teachers. *Journal of English Language Teaching and English Linguistics*, *10*(2), 70–89. https://doi.org/10.31316/eltics.v10i2.8419

Sarifa, N., & Jabeen, R. (2024). Challenges and Predicaments in Teaching "English for Science" in an ESP Classroom: A Research Study to Pinpoint Problems and Solutions. *International Journal of English Language Teaching*, *12*(1), 80–89. https://doi.org/10.37745/ijelt.13/vol12n18089

Saud, D. S. (2025). Enhancing English Language Teaching through Teacher Professional Development. *Far Western Review*, *3*(1), 58–76. https://doi.org/10.3126/fwr.v3i1.84610

Scherzinger, L., & Brahm, T. (2023). A systematic review of bilingual education teachers' competences. *Educational Research Review*, *39*, 100531. https://doi.org/10.1016/j.edurev.2023.100531

Song, W., & Su, G. (2025). The Impact of Motivation, Emotion and Attitude on Foreign Language Learning and Its Implications for College English Teaching. *Asian Journal of Education and Social Studies*, *51*(4), 1–7. https://doi.org/10.9734/ajess/2025/v51i41843

Sula, G., Bodinaku, B., Zahaj, S., Hoxha, M., & Sulstarova, A. (2024). Unleashing Student Motivation and Engagement Through Content and Language Integrated Learning and Video Integration in Physics Education – Insights from an Albanian Case Study. *Academic Journal of Interdisciplinary Studies*, *13*(5), 75. https://doi.org/10.36941/ajis-2024-0152

Sultana, S., & Fang, F. (2024). English as the medium of instruction and mother-tongue-based translanguaging: Challenges and prospects for tertiary education in Bangladesh and China. *International Journal of Educational Development*, *104*, 102951. https://doi.org/10.1016/j.ijedudev.2023.102951

van Pinxteren, B. (2023). The relevance of medium of instruction and mother tongue for different types of educational systems. *International Journal of Educational Development*, *103*, 102923. https://doi.org/10.1016/j.ijedudev.2023.102923

Villabona, N., & Cenoz, J. (2022). The integration of content and language in CLIL: a challenge for content-driven and language-driven teachers. *Language, Culture and Curriculum*, *35*(1), 36–50. https://doi.org/10.1080/07908318.2021.1910703

Yong-bi, Z. (2003). *Improving college English teaching quality*.

Zaitun Qamariah, & Hadma Yuliani. (2024). Language and Science: The Importance of English Language Learning for Students of the Physics Education Study Program. *Sintaksis : Publikasi Para Ahli Bahasa Dan Sastra Inggris*, *2*(3), 01–11. https://doi.org/10.61132/sintaksis.v2i3.461

Zeidan, M., Allred, J., & Zhao, R. (2023). Effects of language gap interference for English as a second language students in solving physics problems. *Journal of Learning Development in Higher Education*, *28*. https://doi.org/10.47408/jldhe.vi28.934

Zhong M. A. (2020). *Case Study of English Teacher's Teaching Belief in Senior High School ——Comparison and Analysis of New and Veteran Teacher's Belief*.

Zulaiha, S. (2023). Teachers' Perceptions of English Use in STEM Instruction. *Indonesian Journal of English Language Teaching*, *18*(2), 112–125.