



The Effectiveness of English as a Science Medium Instruction in Higher Education

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Abstract: This research presents a comprehensive analysis of English as a Medium of Instruction (EMI) in higher education, drawing insights from seven studies involving 150 students. The investigation delves into various factors such as academic proficiency, TOEFL scores, and gender distribution. Findings reveal a clustering of TOEFL scores around the midpoint of the range, suggesting a normal distribution. However, gender distribution exhibits significant deviations from normalcy. Despite these variations, detailed statistical analyses offer valuable insights into student performance within EMI programs. Moving beyond data analysis, a systematic review explores the impact and effective practices of EMI in higher education. It acknowledges the ongoing debate regarding EMI's influence on language proficiency and academic achievement. While some studies suggest positive outcomes, others highlight challenges and discrepancies, emphasizing the complexity of evaluating EMI's success. The review underscores the importance of examining diverse linguistic and non-linguistic factors and calls for further research to inform instructional strategies. Furthermore, the study identifies effective practices in EMI implementation, emphasizing instructional techniques, curriculum design, language support services, assessment procedures, faculty development, and reflective practice. These approaches aim to create inclusive learning environments conducive to language acquisition, subject matter learning, and student success. Additionally, the review proposes solutions to address challenges and promote inclusivity in EMI contexts, including cultural orientation programs, academic assistance, institutional regulations, social justice initiatives, intercultural competencies, and student-centered teaching approaches. This holistic approach seeks to enhance the long-term success and well-being of students within the EMI framework in higher education.

Keywords: Academic proficiency; English Medium Instruction (EMI); Higher education

Introduction

English Medium Instruction (EMI) has emerged as a prominent approach in higher education institutions worldwide, aiming to enhance students' language proficiency and prepare them for global academic and professional environments. With the increasing globalization and internationalization of higher

education, the adoption of EMI programs has become widespread, including in countries where English is not the native language.

In investigating the impact and effective practices of EMI in higher education, a systematic review is critical. This systematic review seeks to explore EMI's impact and effective practices in higher education settings. By conducting a comprehensive analysis of

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existing literature, this research aims to shed light on the effectiveness of EMI programs in enhancing students' academic performance, language proficiency, and overall learning experience (Macaro et al., 2020).

At the beginning of this research, some reviews were conducted to determine its prominence. The article "Variables affecting English-medium instruction students' achievement: Results of a multiple regression analysis" explores the factors that influence students' academic achievement in EMI programs. The study focuses on EMI students at a state university in Indonesia. It investigates the effects of gender, prior education, socioeconomic status (SES), English proficiency, and study load on academic achievement (Muttaqin & Chuang, 2022).

The article highlights the widespread adoption of EMI in higher education institutions in non-English-speaking countries due to the demand for internationalization and the status of English as a lingua franca. EMI refers to using the English language to teach academic subjects in countries where English is not the first language. The study emphasizes that EMI is oriented toward content teaching and learning (Li & Wu, 2018), with English proficiency being a byproduct.

The article suggests that policymakers and educators consider these variables when designing and implementing EMI programs. It emphasizes the need for support and infrastructure to enhance lecturers' and students' English proficiency and confidence. The study's findings contribute to the evaluation and improvement of EMI programs in Indonesia.

The article titled "A Systematic Review of English Medium Instruction in Higher Education" provides an overview and analysis of the phenomenon of EMI in higher education settings. The systematically reviewed 83 studies to examine the growth, implications, and research evidence related to EMI (Macaro et al., 2018).

The article begins by highlighting the need for a systematic review of research in EMI in higher education and situating this review within the broader field of research on content and language integration in education. The authors define EMI as the use of the English language to teach academic subjects (other than English itself) in countries or jurisdictions where the first language of the majority of the population is not English.

The review discusses the growth of EMI in different geographical areas, particularly in higher education. It explores the motivations behind the increasing adoption of EMI, such as the internationalization of universities, attracting international students, and the status of English as an international language in research publications (Macaro et al., 2018). The article also acknowledges the concerns and challenges associated with the introduction and implementation of EMI.

The authors emphasize the importance of examining the impact of EMI on English language learning and content learning. They highlight the need to assess whether teaching academic subjects through English as a second language (L2) benefits English language proficiency without negatively affecting content learning. The review aims to determine the extent to which the existing research evidence supports these two outcomes of EMI.

Based on the information provided in the excerpt, there are two research gaps identified in the article: lack of research on the impact of EMI on language learning and content learning. The article highlights the need for research that examines whether teaching academic subjects through English as a second language (L2) benefits English language proficiency without negatively affecting content learning. The authors state that there is insufficient research evidence to definitively assert the benefits of EMI for language learning or its impact on content learning. Therefore, there needs to be more research to understand the specific effects of EMI on language and content learning outcomes in higher education settings (Pecorari & Malmström, 2018; Wilde et al., 2020).

There is a need for more studies on the effective practices and outcomes of EMI in higher education. The review points out that more studies are needed to demonstrate the kind of classroom discourse and practices that may lead to beneficial outcomes in EMI settings (Aizawa & Rose, 2019). This suggests a research gap in identifying and exploring effective instructional strategies, pedagogical approaches, and classroom interactions that optimize language and content learning in EMI contexts (Sahan et al., 2021). There is a need for more research that investigates the specific practices and methodologies that can enhance the effectiveness of EMI programs in higher education. These research gaps indicate the need for further empirical studies and investigations to fill the knowledge void regarding the impact of EMI on language and content learning outcomes, as well as to identify effective practices and strategies for implementing EMI in higher education settings.

The research novelty of the article lies in its systematic review approach and its focus on EMI in higher education. While EMI has gained significant attention and has been implemented in various educational settings, there is a lack of comprehensive and systematic reviews specifically examining its impact on higher education. While there is a growing interest in implementing EMI programs, there is a lack of studies that provide insights into the classroom discourse, pedagogical approaches, and instructional strategies that can optimize language and content learning in EMI

settings (Chapple, 2015). The article calls for more research in this area, aiming to contribute to the development of evidence-based practices for EMI implementation in higher education.

Overall, the research novelty of the article lies in its systematic review methodology, its focus on EMI in higher education, and its emphasis on examining the impact on language and content learning as well as identifying effective practices. By addressing these research gaps, the article contributes to the existing literature and provides valuable insights for policymakers, educators, and researchers interested in EMI in higher education.

Method

The study methods part of this systematic review bridges the identified research gaps and objectives indicated in the introduction. The narrative for this section can be organized as follows:

Firstly, a systematic review protocol will be designed to ensure the rigor and comprehensiveness of the review. This protocol will outline the study objectives, inclusion and exclusion criteria, search strategy, data extraction methods, and quality assessment procedures. Adherence to established principles, such as the PRISMA framework, will be stressed to assure transparency and repeatability (Prilutskaya, 2021; Salmani-Nodoushan, 2020).

Secondly, a complete literature search strategy will be created to incorporate multiple sources, including academic journals, conference proceedings, dissertations, and grey literature. The focus will be on locating studies relevant to EMI in higher education, analyzing its impact on language and subject learning outcomes, as well as effective implementation methodologies. Keywords and search terms relating to EMI, higher education, language and subject learning, instructional methodologies, and results will be utilized to ensure broad coverage (Rose et al., 2021).

Thirdly, study selection criteria will be set to ensure the relevancy of the chosen research. Factors such as the focus on EMI in higher education settings, the empirical study design, and the availability of appropriate outcome measures will lead to the inclusion process. Both quantitative and qualitative studies published in English-language publications will be evaluated (Rafiq et al., 2021).

Next, data extraction and synthesis will be undertaken systematically to collect essential information from selected studies, including study characteristics, participant demographics, intervention details, outcome measures, and major findings. Data synthesis will require organizing and summarising

retrieved data to discover patterns, themes, and trends across research, permitting a full study (Heggernes, 2021).

Quality assessment will then be conducted using known methodologies and criteria relevant to the study designs involved. The methodological rigor, internal validity, and external validity of each study will be reviewed to ensure the dependability and validity of the synthesis evidence.

Following this, data analysis and interpretation will ensue, involving quantitative data analysis, such as meta-analysis or statistical synthesis, if feasible. Qualitative data analysis will apply thematic analysis or narrative synthesis to uncover common themes and effective techniques (Akinyode & Khan, 2018; Cruzes et al., 2015). Findings will be interpreted in connection to research objectives, addressing identified research gaps and implications for practice, policy, and future research.

Result and Discussion

Information from seven studies on EMI was collected, comprising data from a total of 150 students. These datasets were acquired, taking into account various factors such as academic proficiency at the higher education level, TOEFL score, and gender. The data was then analyzed by considering the normality test as shown in Table 1.

Table 1. Score Normality Test Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Value	150	402.0067	28.05400	350.00	450.00

Table 2. Score Normality Test One-Sample Kolmogorov-Smirnov Test

Parameters	Score
N	150
Normal Parameters ^{a,b}	Mean 402.0067 Std. Deviation 28.05400
Most Extreme Differences	Absolute 0.070 Positive 0.069 Negative -0.070
Test Statistic	0.070
Asymp. Sig. (2-tailed)	0.068 ^c

The dataset comprises 150 TOEFL scores, ranging from 350 to 450, with a mean score of approximately 402.01 and a standard deviation of around 28.05. This indicates that, on average, the TOEFL scores in the dataset are relatively close to the midpoint of the score range. The minimum score observed is 350, while the maximum is 450, reflecting the full range of possible scores within the dataset.

The results of the one-sample Kolmogorov-Smirnov test indicate that the distribution of TOEFL scores does not significantly deviate from a normal distribution. The test statistic, calculated at approximately 0.070, suggests that the most extreme differences between the observed distribution and a normal distribution are relatively small. Additionally, the p-value associated with the test statistic, approximately 0.068, exceeds the conventional significance level of 0.05. Therefore, we fail to reject the null hypothesis that the data follows a normal distribution.

In summary, the dataset presents a comprehensive overview of TOEFL scores, capturing variability within a range that spans from 350 to 450. The descriptive statistics, including mean, standard deviation, minimum, and maximum values, offer insights into the central tendency and dispersion of the scores. Furthermore, the results of the Kolmogorov-Smirnov test provide assurance that the distribution of scores aligns reasonably well with a normal distribution, enhancing the reliability of statistical analyses conducted on the dataset.

Table 4. Gender Normality Test Descriptive Statistics

	N	Mean	Std. Deviation	Min	Max
Gender	150	1.4200	0.49521	1.00	2.00

Table 5. Gender Normality One-Sample Kolmogorov-Smirnov Test

Parameters	Gender
	N 150
Normal Parameters ^{a,b}	Mean 1.4200
	Std. Deviation .49521
Most Extreme Differences	Absolute .382
	Positive .382
	Negative -.299
	Test Statistic .382
Asymp. Sig. (2-tailed)	.000 ^c

The provided data presents the results of a Gender Normality Test using the One-Sample Kolmogorov-Smirnov Test. Let's delve into the descriptive statistics first. The dataset consists of 150 observations on gender. The mean gender value is reported as 1.4200, with a standard deviation of 0.49521. This indicates that, on average, the gender values are slightly above 1, with some variability around this mean. The minimum gender value observed is 1.00, while the maximum is

2.00, suggesting a binary coding system where 1 may represent one gender category and 2 another.

Moving on to the One-Sample Kolmogorov-Smirnov Test, its purpose is to assess whether the distribution of gender values follows a normal distribution. The test statistics provided indicate that the most extreme difference between the empirical distribution function of the sample and the cumulative distribution function of the standard normal distribution is 0.382. This value, along with the associated p-value of 0.000, suggests that there is a significant deviation from normality. The small p-value indicates strong evidence against the null hypothesis of normality, implying that the gender data does not conform to a normal distribution.

Table 6. Data Descriptive Statistics Case Processing Summary

	Valid		Missing		Cases Total	
	N	Percent	N	Percent	N	Percent
Toefl	150	100.0%	0	0.0%	150	100.0%

Table 7. Data Descriptive Statistics

	Statistic	Std. Error
TOEFL	Mean 402.0067	2.29060
95% Confidence Interval for Mean	Lower Bound 397.4804	
	Upper Bound 406.5329	
5% Trimmed Mean	402.1519	
Median	401.0000	
Variance	787.027	
Std. Deviation	28.05400	
Minimum	350.00	
Maximum	450.00	
Range	100.00	
Interquartile Range	47.00	
Skewness	.001	.198
Kurtosis	-1.074	.394

The provided data furnishes an in-depth look into the descriptive statistics of TOEFL scores, a common measure of English proficiency for non-native speakers. The mean TOEFL score is calculated at approximately 402, indicating the central tendency of the dataset. This figure serves as a pivotal point for understanding the overall performance of test-takers. Moreover, the 95% confidence interval for the mean, ranging from 397.48 to 406.53, provides valuable insight into the precision of this estimate, instilling confidence in its reliability.

Additionally, the dataset offers a 5% trimmed mean, which accounts for extreme values at the tails of the distribution. The resulting trimmed mean, marginally higher than the original mean, suggests that

extreme values exert a slight influence on the overall average score. This nuanced adjustment underscores the importance of considering outliers in statistical analyses, as they can potentially skew interpretations. Similarly, the median TOEFL score of 401 offers an alternative measure of central tendency, particularly useful when dealing with skewed distributions.

Examining the dispersion of scores, the variance is computed at approximately 787.027, providing a measure of the spread of scores around the mean. This variability is further elucidated by the standard deviation of approximately 28.054, indicating the average deviation of scores from the mean. The minimum and maximum scores, recorded at 350 and 450 respectively, delineate the range of scores observed in the dataset, highlighting the diversity of performance among test-takers.

Moreover, the interquartile range (IQR), calculated at 47, offers valuable information about the spread of scores between the first and third quartiles. This measure, coupled with the skewness and kurtosis statistics, provides insights into the shape and symmetry of the distribution. With a skewness close to zero, indicating approximate symmetry, and a slightly negative kurtosis, suggesting a distribution slightly flatter than the normal curve, the TOEFL scores exhibit characteristics of a relatively normal distribution.

In summation, the descriptive statistics unveiled in this dataset furnish a comprehensive understanding of TOEFL scores, encompassing measures of central tendency, dispersion, and distributional characteristics. This nuanced analysis not only facilitates the interpretation of individual test scores but also offers valuable insights into the broader patterns and trends within the dataset, informing decision-making processes related to English language proficiency assessment.

The research data provided encompasses findings from seven studies on EMI, focusing on 150 students and various factors such as academic proficiency at the higher education level, TOEFL scores, and gender. The TOEFL dataset reveals that scores range from 350 to 450, with an average score of approximately 402.01 and a standard deviation of around 28.05. This indicates that the scores are clustered around the midpoint of the score range, with some variability. The one-sample Kolmogorov-Smirnov test results suggest that the TOEFL scores distribution closely aligns with a normal distribution, as the test statistic and associated p-value fail to reject the null hypothesis.

Regarding gender, the data shows that the mean gender value is 1.4200, with a standard deviation of 0.49521. The minimum and maximum gender values are 1.00 and 2.00, respectively, suggesting a binary coding system. However, the results of the Kolmogorov-

Smirnov test indicate a significant deviation from normality, with a small p-value suggesting strong evidence against the null hypothesis. Further analysis of the TOEFL scores provides descriptive statistics such as mean, standard error, variance, skewness, and kurtosis. The data highlights the distribution's central tendency, spread, and shape, offering valuable insights into test-takers' performance. Additionally, a stem and leaf plot may visually represent the data's distribution.

In summary, the research data provides a comprehensive overview of TOEFL scores and gender distribution among students in EMI settings. The findings underscore the importance of considering statistical assumptions and conducting thorough analyses to interpret the data accurately. EMI has gained significant attention in higher education institutions worldwide to enhance students' English language proficiency and academic success. This systematic review aims to investigate EMI's impact and effective practices in higher education, drawing on a comprehensive analysis of existing literature and empirical data.

Impact of EMI on Student Language Proficiency and Academic Achievement:

The impact of English as a medium of instruction on student language ability is a source of continuous controversy in educational research. While some studies suggest that EMI courses may not significantly improve students' English proficiency or positively influence their English learning and usage, others argue that EMI can indeed enhance various aspects of language proficiency, including technical terminology comprehension, listening, reading, speaking, vocabulary acquisition, writing skills, and grammatical knowledge.

This discrepancy in data underscores the difficulties of measuring the impact of EMI on language proficiency (Airey et al., 2017). Numerous linguistic and non-linguistic elements can influence pupils' language development in EMI settings. For example, students' baseline levels of English competence and their ambition to study English substantially shape language acquisition outcomes (Rose et al., 2020). Additionally, contextual factors such as instructional quality, curriculum design, and the availability of language support services are critical predictors of students' language learning experiences in EMI programs.

When evaluating the success of EMI in boosting language proficiency, it is crucial to include a wide range of characteristics, including students' language-related abilities (Belhiah & Elhami, 2015). By investigating the relationship between these characteristics, researchers

can better understand the intricate mechanisms underpinning language acquisition in EMI situations.

Moreover, the influence of EMI on language proficiency is directly linked to its implications for academic accomplishment. While students' overall levels of English proficiency serve as significant predictors of their academic success within EMI programs, challenges associated with language proficiency, such as difficulties in comprehending course content or expressing ideas effectively, may hinder students' academic performance.

In conclusion, the impact of English as a medium of instruction on student language ability is diverse and depends on different linguistic and non-linguistic elements. Although some studies imply beneficial benefits, current controversy concerning the efficacy of EMI in boosting language competency underlines the need for further research. By addressing the intricacies inherent in EMI situations and evaluating various factors, educators and policymakers can build educated strategies to enhance language learning results for kids enrolled in EMI programs.

Effective Practices in EMI Implementation:

To unearth effective techniques in EMI implementation, it is essential to look into many elements that contribute to the success of such programs. One significant study area is instructional techniques, the cornerstone of effective EMI delivery (Cenoz, 2015; Richards & Pun, 2023). Prioritize research has noted that EMI teachers should prioritize supplemental modalities such as seating arrangements and spatial organization and foster in-class interaction through verbal and non-verbal communication. Additionally, adopting interactional tactics like sheltered instruction helps balance linguistic turn-taking between teachers and learners, producing an inclusive learning environment conducive to language acquisition and topic mastery. These tactics promote student involvement and facilitate comprehension and participation, critical components of successful EMI classrooms.

Another crucial issue is curriculum design, where EMI programs should prioritize content-based training. This strategy ensures that students achieve fluency in English and acquire subject-specific knowledge simultaneously. By integrating language study with academic content, EMI programs efficiently prepare students for academic success in an English-medium setting (Feng et al., 2023; Qiu & Fang, 2022; Rose & McKinley, 2018). Furthermore, offering proper language support services is vital to handling language-related issues students may confront. Whether through additional language sessions, support materials, or

specialized help, these services are crucial in boosting student confidence and success in EMI classrooms.

Assessment procedures in EMI programs must also be carefully considered to monitor student progress and provide a fair evaluation effectively. Tailoring exams to the different requirements of students, including appropriate accommodations for language learners, helps educators monitor student achievement effectively (Lin, 2019). Moreover, faculty development activities are vital for equipping EMI teachers with the necessary skills and expertise to apply effective practices. Continuous professional development opportunities help teachers adapt to the growing requirements of their students and classrooms, thereby boosting the quality of education in EMI programs.

Engaging in reflective practice is another crucial component for EMI teachers, allowing them to analyze their teaching methods and enhance their approaches critically. By reflecting on their experiences and outcomes, teachers can discover areas for improvement and enhance the overall efficacy of their instruction (Jiang et al., 2019). Tactics Additionally, fostering student involvement through numerous tactics, such as encouraging contact, enabling conversations, and introducing group tasks, increases active participation and more profound learning experiences in EMI classrooms.

Policy implementation is also crucial, with defined evaluation methods providing quality assurance and spreading best practices across EMI courses. Flexibility in program models is vital for supporting varied student populations and responding to their particular demands and circumstances. By addressing these criteria and applying successful methods, universities can build robust EMI programs that assist language acquisition and subject matter learning, eventually boosting student performance and academic outcomes.

Addressing Challenges and Promoting Inclusivity in EMI

A comprehensive strategy is necessary to address difficulties and promote inclusivity in English-medium instruction settings. Embracing diversity, inclusion, equity, and access within EMI-TNHE (Teaching and Learning in Higher Education) is vital for developing a socially fair field programs. Programs, such as practical solutions, cultural orientation programs, language tutoring, and academic advice, are crucial in aiding students in EMI environments. These initiatives try to address language, managerial, cultural, and emotional problems students present in such programs. By providing tailored language support and cultural orientation programs, institutions may help students traverse language proficiency challenges and adjust to the cultural nuances of their academic environment

(Wilde et al., 2020). Additionally, tailored academic advice can offer vital guidance to students, aiding them in overcoming problems specific to EMI programs.

Moreover, the creation of comprehensive institutional rules and practices is crucial. These rules should be egalitarian, efficient, and sensitive to kids' different needs in EMI settings. Further techniques for boosting diversity and inclusion in EMI courses include: focusing on social justice ideas; cultivating multicultural competencies among teachers; and adopting student-centered teaching methodologies.

This requires developing learning settings where students from varied backgrounds feel appreciated, respected, and supported in their academic aspirations (Macaro et al., 2018). Additionally, concerns such as the terminology used in EMI courses, the format of EMI programs (required vs. voluntary), and the design of course material and examinations should be driven by inclusivity principles.

By employing these measures, universities can develop inclusive learning environments that encourage students to excel in EMI programs, irrespective of their linguistic or cultural backgrounds. This holistic approach addresses current issues and adds to the long-term success and well-being of students within the EMI-TNHE framework.

Conclusion

The research data presented provides a complete analysis of EMI, particularly in higher education settings. The analysis contains findings from seven research, concentrating on 150 students and diverse criteria such as academic proficiency, TOEFL scores, and gender distribution. The TOEFL dataset suggests a clustering of scores at the midpoint of the range, with a normal distribution seen. However, there are considerable deviations from normalcy in the gender distribution statistics. Despite these disparities, the detailed statistical studies shed light on the performance and characteristics of students within EMI programs. Moving beyond the data, the systematic review digs into the impact and effective methods of EMI in higher education. It acknowledges the ongoing discussion regarding the influence of EMI on language proficiency and academic attainment. While some research imply excellent outcomes, others highlight problems and discrepancies. The review underlines the challenge of analysing the success of EMI, highlighting the significance of examining numerous linguistic and non-linguistic aspects. It also underlines the need for future research to address these difficulties and inform instructional practices. Moreover, the analysis identifies effective methods in EMI implementation, stressing

instructional methodologies, curriculum design, language support services, assessment procedures, faculty development, and reflective practice. These approaches strive to establish inclusive learning settings that encourage language acquisition, subject matter learning, and student achievement. Additionally, the review emphasises solutions for resolving problems and increasing inclusivity in EMI contexts, including cultural orientation programs, academic assistance, institutional regulations, social justice initiatives, intercultural competences, and student-centered teaching approaches.

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Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

References

- Airey, J., Lauridsen, K. M., Räsänen, A., Salö, L., & Schwach, V. (2017). The expansion of English-medium instruction in the Nordic countries: Can top-down university language policies encourage bottom-up disciplinary literacy goals? *Higher Education*, 73(4), 561–576. <https://doi.org/10.1007/S10734-015-9950-2>
- Aizawa, I., & Rose, H. (2019). An analysis of Japan's English as medium of instruction initiatives within higher education: the gap between meso-level policy and micro-level practice. *Higher Education*, 77(6), 1125–1142. <https://doi.org/10.1007/S10734-018-0323-5>
- Akinyode, B. F., & Khan, T. H. (2018). Step by step approach for qualitative data analysis. *International Journal of Built Environment and Sustainability*, 5(3). <https://doi.org/10.1113/ijbes.v5.n3.267>
- Belhiah, H., & Elhami, M. (2015). English as a medium of instruction in the Gulf: When students and teachers speak. *Language Policy*, 14(1), 3–23. <https://doi.org/10.1007/S10993-014-9336-9>
- Cenoz, J. (2015). Content-based instruction and content and language integrated learning: the same or different? *Language. Culture and Curriculum*, 28(1),

- 8–24.
<https://doi.org/10.1080/07908318.2014.1000922>
- Chapple, J. (2015). Teaching in English Is Not Necessarily the Teaching of English. *International Education Studies*, 8(3).
<https://doi.org/10.5539/IES.V8N3P1>
- Cruzes, D. S., Dybå, T., Runeson, P., & Höst, M. (2015). Case studies synthesis: a thematic, cross-case, and narrative synthesis worked example. *Empirical Software Engineering*, 20, 1634–1665.
<https://doi.org/10.1007/s10664-014-9326-8>
- Feng, L., He, L., & Yiganmu, A. (2023). Determinants of students' academic success in English as a medium of instruction (EMI) classes: A systematic review. *Heliyon*.
<https://doi.org/10.1016/j.heliyon.2023.e20421>
- Heggernes, S. L. (2021). A critical review of the role of texts in fostering Intercultural Communicative competence in the English Language classroom. *Educational Research Review*, 33, 100390.
<https://doi.org/10.1016/J.EDUREV.2021.100390>
- Jiang, L., Zhang, L. J., & May, S. (2019). Implementing English-medium instruction (EMI) in China: teachers' practices and perceptions, and students' learning motivation and needs*. *International Journal of Bilingual Education and Bilingualism*, 22(2), 107–119.
<https://doi.org/10.1080/13670050.2016.1231166>
- Li, N., & Wu, J. (2018). Exploring assessment for learning practices in the EMI classroom in the context of Taiwanese higher education. *Language Education & Assessment*, 1(1), 28–44.
<https://doi.org/10.29140/lea.v1n1.46>
- Lin, A. M. Y. (2019). Theories of trans/languageing and trans-semiotizing: implications for content-based education classrooms. *International Journal of Bilingual Education and Bilingualism*, 22(1), 5–16.
<https://doi.org/10.1080/13670050.2018.1515175>
- Macaro, E., Curle, S., Pun, J., An, J., & Dearden, J. (2018). A systematic review of English medium instruction in higher education. *Language Teaching*, 51(1), 36–76.
<https://doi.org/10.1017/S0261444817000350>
- Macaro, E., Tian, L., & Chu, L. (2020). First and second language use in English medium instruction contexts. *Language Teaching Research*, 24(3), 382–402. <https://doi.org/10.1177/1362168818783231>
- Muttaqin, S., & Chuang, H. H. (2022). Variables affecting English-medium instruction students' achievement: Results of a multiple regression analysis. *International Journal of Educational Research Open*, 3, 100152.
<https://doi.org/10.1016/J.IJEDRO.2022.100152>
- Pecorari, D., & Malmström, H. (2018). At the Crossroads of TESOL and English Medium Instruction. *TESOL Quarterly*, 52(3), 497–515.
<https://doi.org/10.1002/TESQ.470>
- Prilutskaya, M. (2021). Examining Pedagogical Translanguaging: A Systematic Review of the Literature. *Languages*, 6(4), 180.
<https://doi.org/10.3390/LANGUAGES6040180>
- Qiu, X., & Fang, C. (2022). Creating an effective English-Medium Instruction (EMI) classroom: Chinese undergraduate students' perceptions of native and non-native English-speaking content teachers and their experiences. *International Journal of Bilingual Education and Bilingualism*, 25(2), 641–655.
<https://doi.org/10.1080/13670050.2019.1707769>
- Rafiq, K. R. M., Hashim, H., & Yunus, M. M. (2021). Sustaining Education with Mobile Learning for English for Specific Purposes (ESP): A Systematic Review (2012–2021). *Sustainability*, 13(17), 9768.
<https://doi.org/10.3390/SU13179768>
- Richards, J. C., & Pun, J. (2023). A typology of English-medium instruction. *RELC Journal*, 54(1), 216–240.
<https://doi.org/10.1177/0033688220968584>
- Rose, H., Curle, S., Aizawa, I., & Thompson, G. (2020). What drives success in English medium taught courses? The interplay between language proficiency, academic skills, and motivation. *Studies in Higher Education*, 45(11), 2149–2161.
<https://doi.org/10.1080/03075079.2019.1590690>
- Rose, H., & McKinley, J. (2018). Japan's English-medium instruction initiatives and the globalization of higher education. *Higher Education*, 75(1), 111–129.
<https://doi.org/10.1007/S10734-017-0125-1>
- Rose, H., McKinley, J., & Galloway, N. (2021). Global Englishes and language teaching: A review of pedagogical research. *Language Teaching*, 54(2), 157–189.
<https://doi.org/10.1017/S0261444820000518>
- Sahan, K., Rose, H., & Macaro, E. (2021). Models of EMI pedagogies: At the interface of language use and interaction. *System*, 101, 102616.
<https://doi.org/10.1016/j.system.2021.102616>
- Salmani-Nodoushan, M. A. (2020). English for specific purposes: Traditions, trends, directions. *Studies in English Language and Education*, 7(1), 247–268.
<https://doi.org/10.24815/SIELE.V7I1.16342>
- Wilde, V., Brysbaert, M., & Eyckmans, J. (2020). Learning English through out-of-school exposure. Which levels of language proficiency are attained and which types of input are important? *Bilingualism: Language and Cognition*, 23(1), 171–185.
<https://doi.org/10.1017/S1366728918001062>