

Filipino as a Linguistic Resource in Science Learning: Perspectives of Secondary Students in the Philippines

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ABSTRACT

Language plays an important role in shaping students' access to scientific meaning, particularly in multilingual classrooms, where the language of formal instruction may differ from the language students use most comfortably in everyday communication. In the Philippine context, English remains prominent in science education, whereas Filipino continues to function as a familiar linguistic resource for many learners. However, limited evidence exists on how secondary students perceive the use and importance of Filipino in science classroom discussions in the Philippines. This study examined the frequency of Filipino language use, its perceived importance in science learning, and the differences in these perceptions across grade levels. A quantitative descriptive-comparative design was employed involving 100 students from Grades 7 to 10 at Potia National High School, with 25 students representing each grade level. Data were collected using a structured questionnaire and analysed using median, mode, Kruskal-Wallis H test, and post hoc comparison. The findings showed that Filipino was used occasionally in science discussions and was perceived as moderately important in supporting students' understanding of lessons and the expression of ideas. No significant differences were found in the frequency of Filipino use across grade levels, whereas a significant difference emerged in its perceived importance, with Grade 7 students assigning greater value to Filipino than students in higher grades. These findings suggest that Filipino functions as a supplementary but meaningful linguistic resource in an English-dominant science-learning environment. This study highlights the value of strategic linguistic flexibility in supporting more linguistically and culturally responsive science pedagogy.

Keywords: culturally responsive pedagogy, Filipino language, linguistic resources, multilingual science education, secondary education.

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INTRODUCTION

Learning science requires students to understand concepts, processes, and explanations, as well as to interpret and communicate them through disciplinary language.¹ Scientific learning is therefore inseparable from language, particularly because students are expected to engage with specialised terminology, explain relationships between concepts, formulate questions, and participate in classroom discussions.² In multilingual educational settings, these demands become more complex because the language through which science is formally taught may not always correspond to the language that students use most comfortably for everyday communication and meaning-making.³ Consequently, students' access to familiar linguistic resources can influence how they engage with scientific ideas, participate in classroom interactions, and communicate their understanding.⁴ Research on multilingual education has consistently emphasised that learners may benefit when instruction allows them to draw on linguistic resources that are already familiar to them, particularly when encountering conceptually demanding academic content.⁵

This issue is particularly relevant in the Philippines, where multilingualism is part of students' everyday educational and social experiences.⁶ Filipino and English are both recognised within the national linguistic landscape, and numerous regional and local languages are widely used across communities.⁷ The 1987 Philippine Constitution supports the continuing development and use of Filipino as a language of communication and instruction.⁸ Nevertheless, English continues to occupy a prominent position in science education, particularly because textbooks, scientific terminology, assessment materials, and formal academic discourse are frequently presented in English.⁹ This situation creates pedagogical tension. While English provides students with access to internationally

¹ María González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens," *Educational Researcher* 52, no. 9 (December 27, 2023): 570–79, <https://doi.org/10.3102/0013189X231206172>.

² González-Howard et al.

³ Kevin W. H. Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students," *Research in Science Education* 52, no. 3 (June 15, 2022): 975–1012, <https://doi.org/10.1007/s11165-021-10018-6>.

⁴ Jack K. H. Pun and Kevin W. H. Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions," *International Journal of Science Education* 43, no. 7 (May 3, 2021): 1112–39, <https://doi.org/10.1080/09500693.2021.1902015>.

⁵ Zhenjie Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review," *Journal of Research in Science Teaching* 62, no. 1 (January 17, 2025): 270–306, <https://doi.org/10.1002/tea.22008>; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁶ Robin Atilano De Los Reyes and Evelyn Romaguera Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines," *Journal of Language, Identity & Education* 23, no. 6 (November 27, 2024): 940–54, <https://doi.org/10.1080/15348458.2022.2070848>; Jie Zeng and Xiaolong Li, "Ideologies Underlying Language Policy and Planning in the Philippines," *Humanities and Social Sciences Communications* 10, no. 1 (July 12, 2023): 405, <https://doi.org/10.1057/s41599-023-01911-8>.

⁷ Zeng and Li, "Ideologies Underlying Language Policy and Planning in the Philippines."

⁸ Commission on Elections, "1987 Constitution - Article XIV Republic of the Philippines," 1987, <https://www.comelec.gov.ph/?r=References/RelatedLaws/Constitution/1987Constitution/Article14>; Zeng and Li, "Ideologies Underlying Language Policy and Planning in the Philippines."

⁹ Dirk Diestro, "Exploring Students' Performance Using Lingua Franca in Science Education: A Study of Grade Ten Students in Capiz, Philippines," *F1000Research* 12 (November 6, 2023): 1439, <https://doi.org/10.12688/f1000research.141170.1>.

established scientific terminology, Filipino may offer a more familiar linguistic resource through which some learners can clarify ideas, express uncertainty, ask questions, and connect abstract concepts with their prior knowledge and everyday experiences.¹⁰

The pedagogical relevance of familiar languages in multilingual classrooms should not be understood as a choice between English and Filipino.¹¹ Rather, the two languages may perform complementary functions in science learning.¹² English may remain important for disciplinary terminology and formal scientific communication, whereas Filipino can function as a supportive resource for explaining, interpreting, and negotiating meaning.¹³ Previous research has indicated that students may experience difficulties when the linguistic demands of science instruction exceed their ability to process specialised academic language, even when they are capable of understanding the underlying concepts.¹⁴ Conversely, allowing students to use familiar languages during classroom interactions may reduce linguistic barriers and provide additional opportunities for participation and conceptual clarification.¹⁵ Such flexibility is particularly important in science, where understanding often develops through discussion, questioning, explanation, and gradual refinement of ideas.¹⁶

This perspective is consistent with research on translanguaging, which views multilingual learners as drawing on their available linguistic repertoires rather than operating through completely separate language systems.¹⁷ In classroom settings, students may move strategically between languages as they interpret information, construct explanations, and communicate ideas.¹⁸ Hou et al. argue that such practices can create more inclusive opportunities for multilingual learners to participate in academic learning.¹⁹ Research in science education likewise suggests that translanguaging can facilitate the negotiation of

¹⁰ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines."

¹¹ De Los Reyes and Bagona.

¹² De Los Reyes and Bagona; Yuhang He and Xiaozhou (Emily) Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms," *International Journal of Applied Linguistics* 34, no. 3 (August 10, 2024): 1012–31, <https://doi.org/10.1111/ijal.12550>.

¹³ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines."

¹⁴ He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Alexis A. López and Sultan Turkan, "Examining How Multilingual Learners Engaged in a Digital Science Modeling Assessment through Translanguaging," *Linguistics and Education* 86 (April 2025): 101393, <https://doi.org/10.1016/j.linged.2025.101393>; Jack K.H. Pun, Xuehua Fu, and Kason Ka Ching Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature," *Studies in Science Education* 60, no. 1 (January 2, 2024): 121–52, <https://doi.org/10.1080/03057267.2023.2188704>; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students"; Han Zheng, Mark Barba Pacheco, and Julie C. Brown, "Enhancing Multilingual Participation in Science Practices through Language Scaffolding," *Language and Education* 39, no. 2 (March 4, 2025): 512–30, <https://doi.org/10.1080/09500782.2024.2430499>.

¹⁵ He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions."

¹⁶ Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions."

¹⁷ Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Catherine Lemmi and Greses Pérez, "Translanguaging in Elementary Science," *International Journal of Science Education* 46, no. 1 (January 2, 2024): 1–27, <https://doi.org/10.1080/09500693.2023.2185115>.

¹⁸ Lemmi and Pérez, "Translanguaging in Elementary Science."

¹⁹ Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review."

scientific meaning by enabling students to connect everyday linguistic resources with disciplinary forms of communication.²⁰ Within the Philippine context, De Los Reyes and Bagona similarly documented the role of translanguaging in multilingual science classrooms, illustrating how learners and teachers may use more than one language to support classroom interaction and conceptual understanding.²¹

The use of Filipino in science education can therefore be examined not simply as a matter of language preference but as part of a broader question concerning linguistic responsiveness in teaching.²² From this perspective, the educational value of Filipino does not depend on its replacing English as the formal language of science.²³ Instead, its significance may lie in the opportunities it provides students to access difficult explanations, articulate emerging ideas, and participate more confidently in classroom discourse.²⁴ This view is compatible with culturally responsive approaches to education, which recognise students' linguistic and cultural resources as potentially meaningful components of learning rather than as obstacles to academic participation.²⁵ In multilingual science classrooms, recognising these resources may enable teachers to maintain disciplinary expectations while providing students with multiple pathways for constructing and communicating understanding.²⁶

Despite increasing attention to multilingual and translanguaging practices, several questions remain concerning how secondary students themselves experience the use of Filipino in science learning.²⁷ Existing research has largely addressed language policy,²⁸ multilingual education,²⁹ classroom translanguaging, or the broader relationship between

²⁰ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

²¹ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines."

²² Bogum Yoon, "Research Synthesis on Culturally and Linguistically Responsive Teaching for Multilingual Learners," *Education Sciences* 13, no. 6 (May 28, 2023): 557, <https://doi.org/10.3390/educsci13060557>.

²³ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

²⁴ Uma Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review," *Discover Education* 4, no. 1 (February 20, 2025): 41, <https://doi.org/10.1007/s44217-025-00423-8>; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

²⁵ Sabrina Wesley-Nero and Kevin Donley, "Culturally and Linguistically Responsive Pedagogy: Examining Teachers' Conceptualizations of Affirmative Instructional Practices for Multilingual Learners," *TESOL Journal* 15, no. 4 (December 19, 2024), <https://doi.org/10.1002/tesj.881>; Yoon, "Research Synthesis on Culturally and Linguistically Responsive Teaching for Multilingual Learners."

²⁶ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

²⁷ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review."

²⁸ Zafira Kirana, Ravindra Putra, and Nayla Qistina, "Translanguaging Practices in Second Language Education AND Their Implications for Multilingual Language Policy," *LIER: Language Inquiry & Exploration Review* 3, no. 1 (2026): 14–25, <https://doi.org/10.71435/688513>.

²⁹ Oksana Chaika, "Translanguaging in Multilingual Classrooms: A Case Study Analysis," *Philological Review*, no. 1 (May 31, 2023): 127–35, <https://doi.org/10.31499/2415-8828.1.2023.281366>.

language and academic learning.³⁰ Comparatively less attention has been given to students' own perceptions of how frequently Filipino is used in science discussions and how important they consider it for understanding lessons and communicating scientific ideas.³¹ Student perspectives are important because linguistically responsive pedagogy is shaped not only by formal policy or teacher practice but also by how learners perceive and use available linguistic resources in actual classroom contexts.³² Moreover, these perceptions may not be uniform across secondary grade levels. As students progress through school and encounter increasing exposure to English-based scientific terminology and disciplinary discourse, the perceived role of Filipino in science learning may differ across stages of secondary education.

Examining this issue in a rural Philippine secondary-school context provides an additional contribution.³³ Educational and linguistic experiences are situated within particular school and community environments, and evidence from individual local contexts can provide insight into how broader language policies are experienced at classroom level.³⁴ Potia National High School in Ifugao provides a relevant setting because students encounter science through an educational environment in which English is prominent in formal disciplinary content while Filipino remains available as a familiar language for communication.³⁵ Teachers may use Filipino to clarify selected concepts, and students may similarly employ it when participating in discussions or expressing ideas.³⁶ However, the extent to which students use Filipino and the importance they assign to it in science learning require empirical examination.

Accordingly, this study investigates Filipino language use and its perceived importance in science classroom discussions among secondary students at Potia National High School. Rather than positioning Filipino and English as competing instructional languages, the study

³⁰ Zhongfeng Tian, "Challenging the 'Dual': Designing Translanguaging Spaces in a Mandarin-English Dual Language Bilingual Education Program," *Journal of Multilingual and Multicultural Development* 43, no. 6 (July 3, 2022): 534–53, <https://doi.org/10.1080/01434632.2022.2085732>; Muhammad Farooq Alam and Muhammad Umar Razzaq, "Translanguaging as Learning Strategy of Multilinguals: A Study of Pakistani English Language Classrooms," *Human Nature Journal of Social Sciences* 6, no. 3 (September 10, 2025): 92–108, <https://doi.org/10.71016/hnjss/xgrrsh39>; De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review."

³¹ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review."

³² So Lim Kim and Deoksoon Kim, "'I Should Only Use One Language': A Case Study of Spanish-Speaking Emergent Bilingual Students' Translanguaging Experiences in a Middle School Science Classroom," *Education Sciences* 14, no. 8 (August 7, 2024): 853, <https://doi.org/10.3390/educsci14080853>.

³³ Alvin D. Tenorio, "When Language Gets into the Equation: Mother Tongue-Based Multilingual Education (MTB-MLE) Policy Appropriation in Elementary Mathematics Instruction," *Journal of Multilingual and Multicultural Development* 45, no. 6 (July 2, 2024): 2064–77, <https://doi.org/10.1080/01434632.2022.2039673>.

³⁴ Karizza P. Bravo-Sotelo, James McLellan, and Noor Azam Haji-Othman, "The Ideological Tug-of-War of Language Policies in the Philippines: Perspectives and Proposal," *Asian Englishes* 26, no. 2 (May 3, 2024): 564–78, <https://doi.org/10.1080/13488678.2023.2257946>; Tenorio, "When Language Gets into the Equation: Mother Tongue-Based Multilingual Education (MTB-MLE) Policy Appropriation in Elementary Mathematics Instruction."

³⁵ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Diestro, "Exploring Students' Performance Using Lingua Franca in Science Education: A Study of Grade Ten Students in Capiz, Philippines."

³⁶ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines."

considers Filipino as a potential linguistic resource within an English-dominant science-learning environment. By foregrounding students' reported practices and perceptions across grade levels, the study seeks to provide context-specific evidence that can inform discussions of multilingual, linguistically responsive, and culturally responsive science pedagogy in secondary education. Specifically, the study addresses the following research questions:

1. What is the reported frequency of Filipino language use among secondary students during science classroom discussions?
2. Is there a significant difference in the frequency of Filipino language use across Grades 7, 8, 9, and 10?
3. How do secondary students perceive the importance of Filipino in supporting their learning and communication of ideas in science?
4. Is there a significant difference in the perceived importance of Filipino in science learning across Grades 7, 8, 9, and 10?

By addressing these questions, this study extends the discussion beyond whether Filipino should or should not be used as a medium of science instruction. Instead, it examines how students perceive its place within their existing linguistic repertoire and the extent to which it remains relevant to their engagement with science. In doing so, the study contributes learner-centred evidence to continuing discussions about how multilingual resources can be recognised within science classrooms while maintaining students' engagement with the disciplinary language and terminology required for further scientific learning.

METHOD

This study employed a quantitative descriptive–comparative research design to examine students' use of Filipino and its perceived importance in science classroom discussions.³⁷ The descriptive component was used to characterise the reported frequency with which students used Filipino during science-related classroom communication and the extent to which they perceived the language as important for understanding science lessons and for expressing scientific ideas. The comparative component was used to determine whether the reported patterns differed across grade levels.³⁸ No instructional treatment or experimental manipulation was introduced, as this study focused on describing students' existing language practices and comparing their perceptions across naturally occurring grade-level groups. This design was considered appropriate because the variables of interest were measured through students' self-reported responses rather than through an intervention.³⁹ In addition, this study sought to identify whether statistically significant differences existed among students from Grades 7 to 10 in relation to both the frequency of Filipino language use and its perceived importance in science learning.

³⁷ Wing-Fu Lai and Melody Fong, "Use of Comparative Research in the Study of Chemistry Education: A Systematic Analysis of the Literature," *Heliyon* 10, no. 1 (January 2024): e22881, <https://doi.org/10.1016/j.heliyon.2023.e22881>.

³⁸ Lai and Fong.

³⁹ Yavuz Akbulut, "Beyond Self-Reports: Addressing Bias and Improving Data Quality in Educational Research," *Eğitimde ve Psikolojide Ölçme ve Değerlendirme Dergisi* 16, no. 2 (June 30, 2025): 115–23, <https://doi.org/10.21031/epod.1630477>.

The study was conducted at Potia National High School in Ifugao, Philippines, during the 2022–2023 academic year. The school provided the context for examining language practices within secondary science education, particularly the use of Filipino during classroom discussions in an instructional environment where students encounter scientific content and terminologies. A total of 100 secondary school students participated in the study. Participants were drawn from four grade levels, with 25 students representing each of grades 7, 8, 9, and 10. This distribution provided equal representation across the four grade-level groups included in the study. Simple random sampling was used to select the respondents. The sampling procedure was intended to provide students within the identified groups with an opportunity to be selected for participation and to reduce systematic bias in the selection of participants. The inclusion of students from four consecutive secondary grade levels enabled the study to examine whether patterns of Filipino-language use and perceptions of its importance varied according to students' position within secondary education. Therefore, grade level functioned as the grouping variable in the comparative analyses.

Data were collected using a structured researcher-made questionnaire developed to obtain students' self-reported responses concerning the use of Filipino in science classroom discussions. The questionnaire consisted of two main sections corresponding to the principal variables investigated in this study. The first section focused on the frequency of Filipino-language use during science discussions. It included indicators related to students' use of Filipino in communication, their comfort in expressing ideas in Filipino, their participation in classroom discussions using Filipino, their need for translation during science discussions, and their preference for Filipino in classroom communication. The second section examined students' perceived importance of Filipino in science learning. The indicators addressed whether students considered Filipino helpful in understanding lessons, keeping up with classroom discussions, supporting academic performance, expressing ideas, and functioning appropriately in science discussions. Responses were recorded using a Likert-type scale, allowing students' perceptions to be quantitatively represented and subsequently summarised and compared across grade levels. The questionnaire therefore provided data on two related but conceptually distinct dimensions: how frequently Filipino was reportedly used, and how important students perceived the language to be in supporting their engagement with science learning.

Prior to data collection, permission to conduct the study was obtained from the relevant school administration. The researchers also obtained informed consent from the participants. Participation was voluntary, and the students were informed that their responses would be treated confidentially and anonymously. The questionnaires were administered face-to-face in a controlled classroom setting by trained research assistants. Respondents completed the instrument individually, allowing each participant to provide responses based on their experiences and perceptions of Filipino language use in science discussions. The questionnaires were immediately retrieved after completion. This procedure was used to promote the completeness of the collected responses and to minimise the possibility of missing questionnaires during the data-gathering process.

The collected data were analysed using both descriptive and inferential statistical procedures. Because the responses were generated from Likert-type items and treated as ordinal data, measures appropriate to the nature of the responses were employed.⁴⁰ The median and mode were used to describe students' reported levels of Filipino language use and their perceived importance of Filipino in science learning.⁴¹ These descriptive statistics were used to identify the typical response patterns represented in the dataset and to support the interpretation of students' reported experiences in the study.

The Kruskal–Wallis H test was employed to determine whether differences existed across grade levels.⁴² This non-parametric procedure was used to compare responses among students in Grades 7, 8, 9, and 10. Separate comparisons were conducted for the frequency of Filipino-language use and the perceived importance of Filipino in science learning. The level of statistical significance was set at $p < .05$. Where a statistically significant difference in perceived importance was identified, post hoc analysis using the Dwass–Steel–Critchlow–Fligner procedure was used to identify which grade-level groups differed from one another.⁴³ Ethical principles were followed throughout the study. Participation was voluntary, and confidentiality and anonymity of responses were maintained. The information collected from the respondents was used exclusively for academic research purposes. Permission from the school administration and informed consent from the participants were obtained before the administration of the research instrument.

RESULTS AND DISCUSSION

Results

1. Frequency of Filipino Language Use in Science Classroom Discussions

The first research question examined the reported frequency of Filipino-language use during science classroom discussions. Table 1 presents students' responses across the five indicators of classroom language use. The results indicate that Filipino was occasionally used during science classroom discussions. The overall score of 11 was interpreted as "Sometimes", suggesting that Filipino was not consistently used as the primary language of communication in science classes.

⁴⁰ Iksoo Huh and Jungsoo Gim, "Exploration of Likert Scale in Terms of Continuous Variable with Parametric Statistical Methods," *BMC Medical Research Methodology* 25, no. 1 (September 29, 2025): 218, <https://doi.org/10.1186/s12874-025-02668-1>; James R. Lindner and Nicholas Lindner, "Interpreting Likert Type Scales, Summated Scales, Unidimensional Scales, and Attitudinal Scales: I Neither Agree nor Disagree, Likert or Not," *Advancements in Agricultural Development* 5, no. 2 (January 31, 2024): 152–63, <https://doi.org/10.37433/aad.v5i2.351>.

⁴¹ Lindner and Lindner, "Interpreting Likert Type Scales, Summated Scales, Unidimensional Scales, and Attitudinal Scales: I Neither Agree nor Disagree, Likert or Not."

⁴² Rehan Ahmad Khan Sherwani et al., "Analysis of COVID-19 Data Using Neutrosophic Kruskal Wallis H Test," *BMC Medical Research Methodology* 21, no. 1 (December 17, 2021): 215, <https://doi.org/10.1186/s12874-021-01410-x>.

⁴³ Critchlow E. Douglas and Fligner A. Michael, "On Distribution-Free Multiple Comparisons in the One-Way Analysis of Variance," *Communications in Statistics - Theory and Methods* 20, no. 1 (January 27, 1991): 127–39, <https://doi.org/10.1080/03610929108830487>.

Table 1. Frequency of Filipino Language Use in Science Classroom Discussions

Indicators	Mode	Interpretation
Daily use of Filipino in communication	3	Often
Comfort in expressing ideas in Filipino	2	Sometimes
Active participation using Filipino	3	Often
Need for translation in science discussions	2	Sometimes
Preference for Filipino-only discussions	1	Not at all
Overall Score	11	Sometimes

At the indicator level, students reported that they often used Filipino in daily communication and actively participated in classroom discussions. In contrast, their comfort in expressing ideas in Filipino and their need for translation during science discussions were rated as occurring only occasionally. The lowest response was recorded for the preference for Filipino-only discussions, which was interpreted as “Not at all”. These findings show that Filipino remained present in classroom communication but was not consistently preferred as the sole language for science discussion. Its use appears to vary according to the communicative demands of classroom interaction.

2. Differences in the Frequency of Filipino Use across Grade Levels

The second research question examined whether the frequency of Filipino language use differed significantly among students in Grades 7, 8, 9, and 10. The Kruskal–Wallis H test was used to compare the four grade-level groups. The median scores ranged from 11–12 across the four grade levels. Grades 7 and 9 recorded median scores of 11, and Grades 8 and 10 recorded median scores of 12.

Table 2. Kruskal–Wallis Test on Frequency of Filipino Use across Grade Levels

Grade Level	Median	H-value	p-value	Decision	Interpretation
Grade 7	11				
Grade 8	12				
Grade 9	11				
Grade 10	12	3.50	.321	Fail to reject H_0	No significant difference

The Kruskal–Wallis test yielded an H-value of 3.50 and a p-value of .321. Because the p-value was greater than the .05 level of significance, the null hypothesis was not rejected. Therefore, no statistically significant difference was found in the frequency of Filipino language use among students in Grades 7, 8, 9, and 10. This result indicates that students across the four grade levels reported broadly similar patterns of Filipino-language use during science classroom discussions.

3. Perceived Importance of Filipino in Science Learning

The third research question examined students’ perceptions of the importance of Filipino in supporting science learning. Table 3 presents the results for five indicators addressing comprehension, classroom participation, academic performance, expression of ideas, and the appropriateness of Filipino for science discussion. All five indicators recorded a mode of 2, corresponding to the interpretation “Sometimes”. An overall score of 10 was also interpreted as “Sometimes”.

Table 3. Perceived Importance of Filipino in Science Learning

Indicators	Mode	Interpretation
Helps understanding of lessons	2	Sometimes
Helps students keep up with lessons	2	Sometimes
Improves academic performance	2	Sometimes
Enhances expression of ideas	2	Sometimes
Appropriate for science discussions	2	Sometimes
Overall Score	10	Sometimes

These findings indicate that students perceive Filipino as moderately important for science learning. In particular, students recognised that Filipino could help them understand lessons, keep up with classroom instruction, express their ideas, and participate in science discussions in English. However, the results also suggest that students did not consistently regard Filipino as essential for every aspect of science learning. Overall, Filipino was perceived as a useful but not exclusively preferred language for supporting students' engagement in science lessons.

4. Differences in the Perceived Importance of Filipino across Grade Levels

The fourth research question examined whether students' perceptions of the importance of Filipino in science learning differed significantly across grade levels. Table 4 presents the results of the Kruskal–Wallis H-test. The median score for Grade 7 was 10, whereas Grades 8, 9, and 10 each had a median score of 11. The Kruskal–Wallis analysis yielded an H-value of 12.70 and a p-value of .005. Since the p-value was below the .05 level of significance, the null hypothesis was rejected.

Table 4. Kruskal–Wallis Test on Perceived Importance of Filipino across Grade Levels

Grade Level	Median	H-value	p-value	Decision	Interpretation
Grade 7	10 ^a				
Grade 8	11 ^b				
Grade 9	11 ^b				
Grade 10	11 ^b	12.70	.005	Reject H ₀	Significant difference

The result indicates a statistically significant difference in students' perceived importance of Filipino across the four grade levels. A post hoc analysis using the Dwass–Steel–Critchlow–Fligner procedure further showed that grade 7 differed significantly from grades 8, 9, and 10. In contrast, the higher grade-level groups did not differ significantly from one another. The results indicate that Grade 7 students placed greater importance on Filipino in science learning than students in higher grades. This finding suggests that perceptions of the value of Filipino were not uniform across secondary grade levels, even though the reported frequency of Filipino use remained statistically similar across Grades 7–10.

Discussion

This study examined the frequency of Filipino language use and its perceived importance in science classroom discussions among secondary students, as well as

differences across grade levels. The findings indicate that Filipino is used only occasionally during science discussions and is perceived as moderately important for supporting students' understanding and expression of ideas. No significant differences were observed in the reported frequency of Filipino use across Grades 7 to 10, whereas a significant difference emerged in students' perceptions of its importance, with Grade 7 students assigning greater value to Filipino than students in higher grade levels. Taken together, these findings suggest that Filipino occupies a supplementary rather than dominant position in science classrooms while continuing to function as a meaningful linguistic resource for some students.⁴⁴

The occasional use of Filipino in science discussions reflects the continuing prominence of English in formal science education.⁴⁵ Scientific terminology, textbooks, instructional materials, and assessment practices are commonly associated with English, which may explain why Filipino is not consistently used as the primary language of classroom interaction.⁴⁶ However, this finding should not necessarily be interpreted as evidence that Filipino has little educational relevance.⁴⁷ Rather, its occasional use may indicate that students employ it selectively when they need additional linguistic support.⁴⁸ In multilingual learning environments, students may not require a familiar language at every stage of a lesson, but they may draw on it when explaining difficult concepts, seeking clarification, participating in discussions, or expressing ideas that are not yet easily articulated in the dominant academic language.⁴⁹ This interpretation is consistent with research showing that

⁴⁴ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁴⁵ Bravo-Sotelo, McLellan, and Haji-Othman, "The Ideological Tug-of-War of Language Policies in the Philippines: Perspectives and Proposal"; Diestro, "Exploring Students' Performance Using Lingua Franca in Science Education: A Study of Grade Ten Students in Capiz, Philippines"; Pun, Fu, and Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature."

⁴⁶ Diestro, "Exploring Students' Performance Using Lingua Franca in Science Education: A Study of Grade Ten Students in Capiz, Philippines"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; López and Turkan, "Examining How Multilingual Learners Engaged in a Digital Science Modeling Assessment through Translanguaging"; Pun, Fu, and Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature."

⁴⁷ Aljahir S. Abdulrahman et al., "Filipino Language as an Auxiliary Medium of Instruction in Teaching Physics," *International Journal of Multidisciplinary: Applied Business and Education Research* 6, no. 12 (December 23, 2025): 6098–6107, <https://doi.org/10.11594/ijmaber.06.12.19>; De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁴⁸ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁴⁹ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

multilingual learners often flexibly use their available linguistic resources when negotiating meaning in academically demanding contexts.⁵⁰

Viewed from this perspective, Filipino can be understood less as an alternative medium that competes with English and more as a complementary resource for science learning.⁵¹ English remains important because it provides students access to established scientific terminology and wider disciplinary discourse.⁵² In contrast, Filipino CTs may support the processes through which students initially interpret, clarify, and communicate scientific ideas.⁵³ Such complementary use reflects the broader principle of translanguaging, in which multilingual learners strategically draw on more than one linguistic resource when constructing understanding.⁵⁴ Previous research in Philippine science classrooms has similarly demonstrated that multilingual classroom interactions can involve movement across languages to support explanation, participation, and comprehension.⁵⁵ The present findings do not establish the effectiveness of translanguaging as an instructional intervention; however, they are consistent with the view that familiar languages may continue to serve meaningful pedagogical functions even when they are not the principal language of formal instruction.⁵⁶

Students' moderate perception of the importance of Filipino provides further insight into this complementary role. Respondents indicated that Filipino was helpful for understanding lessons, keeping up with classroom discussions, improving their ability to express ideas, and supporting their participation in science learning, yet they did not regard it as essential in all instructional situations. This distinction is significant. This suggests that

⁵⁰ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁵¹ Abdulrahman et al., "Filipino Language as an Auxiliary Medium of Instruction in Teaching Physics"; De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions."

⁵² Pun, Fu, and Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁵³ Abdulrahman et al., "Filipino Language as an Auxiliary Medium of Instruction in Teaching Physics"; De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms."

⁵⁴ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Lemmi and Pérez, "Translanguaging in Elementary Science"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁵⁵ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines."

⁵⁶ De Los Reyes and Bagona; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions."

students may recognise the usefulness of Filipino without necessarily preferring a Filipino-only science classroom.⁵⁷ In other words, the pedagogical value of Filipino may be situational rather than absolute.⁵⁸ This may be particularly relevant when students encounter unfamiliar concepts, complex explanations, or difficulties communicating their understanding in English.⁵⁹ This finding supports a more flexible view of classroom language practice, in which linguistic resources are used according to instructional needs rather than rigid language separation.⁶⁰

This flexibility has implications for linguistically and culturally responsive pedagogy.⁶¹ Culturally responsive teaching recognises that students bring existing linguistic and cultural resources into the classroom and that these resources can contribute to meaningful participation in learning.⁶² In the present context, recognising Filipino as part of students' linguistic repertoire does not require replacing English as the language of scientific terminology.⁶³ Instead, it involves acknowledging that learners may benefit from opportunities to connect specialised disciplinary language with more familiar forms of communication.⁶⁴ Therefore, Filipino may serve as a bridge between students' everyday linguistic experiences and the more formal discourse of school science.⁶⁵ This is particularly relevant in lessons where students are expected to explain relationships, justify answers, ask

⁵⁷ Abdulrahman et al., "Filipino Language as an Auxiliary Medium of Instruction in Teaching Physics"; De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions."

⁵⁸ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁵⁹ He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Pun, Fu, and Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁶⁰ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Lemmi and Pérez, "Translanguaging in Elementary Science"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁶¹ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; Yoon, "Research Synthesis on Culturally and Linguistically Responsive Teaching for Multilingual Learners."

⁶² Wesley-Nero and Donley, "Culturally and Linguistically Responsive Pedagogy: Examining Teachers' Conceptualizations of Affirmative Instructional Practices for Multilingual Learners"; Yoon, "Research Synthesis on Culturally and Linguistically Responsive Teaching for Multilingual Learners."

⁶³ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens."

⁶⁴ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Yoon, "Research Synthesis on Culturally and Linguistically Responsive Teaching for Multilingual Learners."

⁶⁵ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens."

questions, or discuss scientific phenomena, as these activities require both conceptual understanding and the ability to communicate that understanding.⁶⁶

The absence of a significant difference in the frequency of Filipino use across grade levels is noteworthy. Students from Grades 7 to 10 reported broadly similar patterns of language use, suggesting that classroom language practices may remain relatively stable across secondary years.⁶⁷ This consistency may reflect school-level instructional norms, teacher language practices, or the continued role of English as the expected language of science across grade levels.⁶⁸ The results indicate that the actual use of Filipino is not strongly differentiated by students' grade level, even though students may differ in how much importance they assign to it. This distinction between use and perceived value is important because it suggests that exposure to a language in the classroom and students' perceptions of its pedagogical usefulness are not necessarily the same phenomenon.⁶⁹

In contrast, the significant difference in perceived importance across grade levels suggests that students' attitudes towards Filipino may vary as they progress through secondary education. Grade 7 students placed greater value on Filipino than did students in Grades 8, 9, and 10. One possible interpretation is that students in the earlier stages of secondary education may rely more strongly on familiar linguistic resources while adjusting to the conceptual and linguistic demands of secondary science.⁷⁰ Therefore, Filipino may be especially valuable for clarifying lessons and expressing emerging scientific ideas during this transitional stage.⁷¹ In comparison, students in higher grade levels may have become more accustomed to English scientific terminology and the language conventions associated with science instruction.⁷² Their greater exposure to disciplinary English may reduce their

⁶⁶ Ganesan, "Evidence-Based Teaching Interventions for Emergent Multilingual Students in High School Science Classrooms: A Literature Review"; González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens."

⁶⁷ Karon Harden, Maitri Punjabi, and Maricel Fernandez, "Influences on Teachers' Use of the Prescribed Language of Instruction: Evidence from Four Language Groups in the Philippines," *Education Quarterly Reviews* 5, no. 1 (March 30, 2022), <https://doi.org/10.31014/aior.1993.05.01.460>.

⁶⁸ Bravo-Sotelo, McLellan, and Haji-Othman, "The Ideological Tug-of-War of Language Policies in the Philippines: Perspectives and Proposal"; De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Harden, Punjabi, and Fernandez, "Influences on Teachers' Use of the Prescribed Language of Instruction: Evidence from Four Language Groups in the Philippines"; Pun, Fu, and Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature."

⁶⁹ Tony Burner and Christian Carlsen, "Teachers' Multilingual Beliefs and Practices in English Classrooms: A Scoping Review," *Review of Education* 11, no. 2 (August 26, 2023), <https://doi.org/10.1002/rev3.3407>; Kim and Kim, "'I Should Only Use One Language': A Case Study of Spanish-Speaking Emergent Bilingual Students' Translanguaging Experiences in a Middle School Science Classroom."

⁷⁰ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Sujin Kim et al., "Supporting Multilingual Learners Through Translanguaging Pedagogy in U.S. K–12 STEM Classrooms: A Systematic Meta-Synthesis," *Education Sciences* 16, no. 3 (March 1, 2026): 376, <https://doi.org/10.3390/educsci16030376>; Zheng, Pacheco, and Brown, "Enhancing Multilingual Participation in Science Practices through Language Scaffolding."

⁷¹ He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students"; Zheng, Pacheco, and Brown, "Enhancing Multilingual Participation in Science Practices through Language Scaffolding."

⁷² Roberto Arias-Hermoso, Ainara Imaz Agirre, and Eneritz Garro Larrañaga, "Multilingual Disciplinary Literacies: Exploring Developmental Patterns of Science Writing across Secondary Education," *Journal of Multilingual and Multicultural*

perceived dependence on Filipino, even though the actual frequency of Filipino use remains relatively similar across grades.⁷³

Nevertheless, this interpretation should be approached cautiously. The study employed a descriptive–comparative design and did not follow the same students longitudinally across grade levels.⁷⁴ Therefore, the observed differences cannot establish that students gradually become less dependent on Filipino as they progress through school.⁷⁵ Rather, the findings show that students at different grade levels reported different perceptions at the time of the data collection. Other factors, including differences in teachers, classroom practices, prior language exposure, academic confidence, and familiarity with scientific terminology, may also contribute to these perceptions.⁷⁶ Therefore, the grade-level pattern should be understood as a basis for further investigation rather than as evidence of a developmental or causal process.⁷⁷

From a pedagogical perspective, the findings support the value of strategic linguistic flexibility in science instruction.⁷⁸ Teachers need not adopt either an English-only or a Filipino-only approach.⁷⁹ Instead, Filipino can be used selectively to clarify difficult ideas, activate prior knowledge, encourage questioning, support peer discussion, and allow students to formulate initial explanations before connecting these ideas to formal English scientific terminology.⁸⁰ Such an approach may help maintain the disciplinary precision associated with English while recognising the communicative resources that students already possess.⁸¹ This balance is

Development 47, no. 5 (May 28, 2026): 2705–23, <https://doi.org/10.1080/01434632.2025.2481200>; Pun, Fu, and Cheung, “Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature”; Zheng, Pacheco, and Brown, “Enhancing Multilingual Participation in Science Practices through Language Scaffolding.”

⁷³ Arias-Hermoso, Imaz Agirre, and Garro Larrañaga, “Multilingual Disciplinary Literacies: Exploring Developmental Patterns of Science Writing across Secondary Education”; González-Howard et al., “Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students’ Experiences with Science Practices Through a Translanguaging Lens.”

⁷⁴ Xiaofeng Wang and Zhenshun Cheng, “Cross-Sectional Studies,” *Chest* 158, no. 1 (July 1, 2020): S65–71, <https://doi.org/10.1016/j.chest.2020.03.012>.

⁷⁵ Wang and Cheng.

⁷⁶ Burner and Carlsen, “Teachers’ Multilingual Beliefs and Practices in English Classrooms: A Scoping Review”; He and Zhou, “Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms”; Pun, Fu, and Cheung, “Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature”; Tai, “Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students.”

⁷⁷ Wang and Cheng, “Cross-Sectional Studies.”

⁷⁸ De Los Reyes and Bagona, “Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines”; Hou et al., “Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review”; Tai, “Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students.”

⁷⁹ De Los Reyes and Bagona, “Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines”; He and Zhou, “Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms”; Pun and Tai, “Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions.”

⁸⁰ González-Howard et al., “Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students’ Experiences with Science Practices Through a Translanguaging Lens”; He and Zhou, “Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms”; Pun and Tai, “Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions”; Zheng, Pacheco, and Brown, “Enhancing Multilingual Participation in Science Practices through Language Scaffolding.”

⁸¹ González-Howard et al., “Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students’ Experiences with Science Practices Through a Translanguaging Lens”; Hou et al., “Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review”; Tai, “Translanguaging as Inclusive Pedagogical

particularly relevant to culturally responsive science teaching because it treats students' linguistic repertoires as educational resources rather than barriers to participation.⁸²

These findings also have implications for discussions of linguistic access in multilingual education.⁸³ If students are expected to learn science exclusively through a language in which they are less confident, difficulties in classroom participation may arise from linguistic demands rather than limitations in conceptual ability.⁸⁴ Providing opportunities to use Filipino at appropriate moments may therefore widen students' access to explanations and classroom interaction.⁸⁵ Simultaneously, the moderate importance assigned to Filipino indicates that such support should be responsive to students' needs rather than imposed uniformly.⁸⁶ The objective is not to reduce exposure to English scientific discourse but to create instructional conditions in which students can move between familiar and disciplinary forms of language as they construct understanding.⁸⁷

Several limitations should be considered when interpreting these results.⁸⁸ The study relied on self-reported perceptions and therefore reflects students' views rather than directly observed classroom language practices.⁸⁹ It was also conducted in a single secondary school with a relatively small sample, limiting the extent to which the findings can be generalised to other schools or linguistic contexts.⁹⁰ Future studies could incorporate classroom

Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students"; Zheng, Pacheco, and Brown, "Enhancing Multilingual Participation in Science Practices through Language Scaffolding."

⁸² Wesley-Nero and Donley, "Culturally and Linguistically Responsive Pedagogy: Examining Teachers' Conceptualizations of Affirmative Instructional Practices for Multilingual Learners"; Yoon, "Research Synthesis on Culturally and Linguistically Responsive Teaching for Multilingual Learners."

⁸³ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁸⁴ López and Turkan, "Examining How Multilingual Learners Engaged in a Digital Science Modeling Assessment through Translanguaging"; Pun, Fu, and Cheung, "Language Challenges and Coping Strategies in English Medium Instruction (EMI) Science Classrooms: A Critical Review of Literature"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁸⁵ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Pun and Tai, "Doing Science through Translanguaging: A Study of Translanguaging Practices in Secondary English as a Medium of Instruction Science Laboratory Sessions"; Zheng, Pacheco, and Brown, "Enhancing Multilingual Participation in Science Practices through Language Scaffolding."

⁸⁶ He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Zheng, Pacheco, and Brown, "Enhancing Multilingual Participation in Science Practices through Language Scaffolding."

⁸⁷ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; He and Zhou, "Facilitating Content Learning through Translanguaging in Secondary EMI Science Classrooms"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁸⁸ Akbulut, "Beyond Self-Reports: Addressing Bias and Improving Data Quality in Educational Research"; Laura R. Peck, "Section Editor's Note: Insights into the Generalizability of Findings from Experimental Evaluations," *American Journal of Evaluation* 43, no. 1 (March 6, 2022): 66–69, <https://doi.org/10.1177/10982140221075092>.

⁸⁹ Akbulut, "Beyond Self-Reports: Addressing Bias and Improving Data Quality in Educational Research"; Katrin Saks, "Three Windows Into Self-Regulated Learning: A Multimodal Triangulation Approach in EFL Classrooms," *European Journal of Education* 60, no. 4 (December 13, 2025), <https://doi.org/10.1111/ejed.70285>.

⁹⁰ Peck, "Section Editor's Note: Insights into the Generalizability of Findings from Experimental Evaluations."

observations, interviews, teacher perspectives, or achievement measures to examine more directly how the strategic use of Filipino influences students' participation and conceptual understanding.⁹¹ Comparative research across schools and regions could also clarify whether the patterns identified in this study are specific to the local context or reflect broader tendencies in Philippine science education.⁹²

This study suggests that Filipino remains a supplementary but meaningful linguistic resource in English-dominant science-learning environments.⁹³ Its occasional use and moderate perceived importance indicate that students do not necessarily regard Filipino as a replacement for English, but they continue to recognise its usefulness in supporting understanding and the communication of ideas.⁹⁴ The significant grade-level difference further suggests that the value students assign to this resource may vary across stages of secondary education. These findings contribute learner-centred evidence to discussions of multilingual science education by highlighting the potential of linguistically responsive teaching practices that retain access to disciplinary English while recognising Filipino as part of students' existing repertoire for scientific meaning-making.⁹⁵

CONCLUSION

This study examined the frequency of Filipino language use and its perceived importance in science classroom discussions among secondary students at Potia National High School. The findings show that Filipino is used only occasionally in science discussions and is perceived as moderately important in supporting students' understanding of lessons and expression of ideas. No significant differences were found in the reported frequency of Filipino use across Grades 7 to 10, whereas a significant difference was observed in its perceived importance, with Grade 7 students assigning greater value to Filipino than students in higher grades.

These findings suggest that Filipino occupies a supplementary but meaningful position in an English-dominant science-learning environment. Its role appears to lie less in replacing English as the language of scientific terminology and more in supporting students when they

⁹¹ Akbulut, "Beyond Self-Reports: Addressing Bias and Improving Data Quality in Educational Research"; Saks, "Three Windows Into Self-Regulated Learning: A Multimodal Triangulation Approach in EFL Classrooms."

⁹² Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Peck, "Section Editor's Note: Insights into the Generalizability of Findings from Experimental Evaluations."

⁹³ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁹⁴ De Los Reyes and Bagona, "Translanguaging in Teaching and Learning Science in Selected Multilingual Elementary Classrooms in the Philippines"; González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

⁹⁵ González-Howard et al., "Language Views for Scientific Sensemaking Matter: A Synthesis of Research on Multilingual Students' Experiences with Science Practices Through a Translanguaging Lens"; Hou et al., "Translanguaging Practices in Global K-12 Science Education Settings: A Systematic Literature Review"; Tai, "Translanguaging as Inclusive Pedagogical Practices in English-Medium Instruction Science and Mathematics Classrooms for Linguistically and Culturally Diverse Students."

need to clarify concepts, communicate emerging ideas and participate in classroom interaction. From this perspective, Filipino can be understood as a linguistic resource that may contribute to more responsive and inclusive science learning, particularly for students who benefit from opportunities to connect disciplinary content with a more familiar language. The results also indicate that the perceived value of Filipino is not uniform across grades. Although patterns of actual use were relatively consistent, students differed in how important they considered Filipino to be for learning science. This suggests that teachers may need to consider students' varying linguistic needs rather than applying a uniform language approach across all secondary school levels.

This study is limited by its reliance on self-reported data, relatively small sample size, and focus on a single school context. Future research should incorporate classroom observations, teacher perspectives, and broader school samples to examine how Filipino and other linguistic resources are used in actual science learning interactions. The study contributes learner-centred evidence to discussions of multilingual science education by showing that Filipino remains relevant as a complementary linguistic resource within secondary science classrooms.

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