Exploring Mathematics and English Diagnostic Results as Indicators of Science ARAL Recipients

Mark Austin Alessandro E. Lopez., Aireen P. Pacano

Abra State Institute of Sciences and Technology Bangued, Abra, Philippines

DOI: https://doi.org/10.47772/IJRISS.2026.100300106

Received: 07 March 2026; Accepted: 12 March 2026; Published: 27 March 2026

ABSTRACT

The Philippine Informal Reading Inventory (Phil-IRI) and the Rapid Mathematics Assessment (RMA), which measure students' reading and mathematics proficiency, can be used to identify learners who may require remediation and support. Currently, the Department of Education (DepEd) does not provide a diagnostic tool specifically for science, making it challenging for teachers and ARAL Program implementers to identify students in need of science assistance. This study aims to utilize existing English and mathematics diagnostic results to select potential Science ARAL beneficiaries. RMA and Phil-IRI results can help teachers identify students who may struggle in science due to insufficient literacy and numeracy skills necessary to comprehend scientific concepts, conduct investigations, and analyze data. The ARAL Program seeks to close learning gaps and provide a recovery plan from Kindergarten through Grade 10, ensuring that no student is left behind. Findings of this study indicate that existing diagnostic tools can effectively identify learners for science intervention, allowing for targeted support to enhance foundational skills and improve learning outcomes.

Keywords- ARAL Program, RMA (Rapid Mathematics Assessment), Phil-Iri (Philippine Informal Reading Inventory), Diagnostic Assessment, Learning Recovery.

INTRODUCTION

The Aral Program (Academic Recovery and Acceleration through Learning) of the Department of Education was solely created to support students who fall or are left behind in basic subjects like Science, English, and mathematics. While standard diagnostic tools exist for assessing learners' performance and ARAL readiness in Mathematics and English, such tools are lacking in Science. The absence of a subject-specific diagnostic tool for science makes it challenging for schools to identify learners objectively. Teachers often adapt non-standardized materials, which may affect consistency in selection. More especially, the science teacher in charge/ARAL implementer—to determine with objectivity which students need support.

Science education involves understanding abstract concepts, performing investigations, interpreting data, and applying reading and mathematical skills in real-life contexts. When learners lack skills in reading comprehension and numeracy, their performance in science is also most likely affected. This study investigates how the existing tools, like RMA, which evaluates numeracy, and Phil-Iri, which assesses reading comprehension, can be utilized to fill the gap in identifying students who should be enrolled in the ARAL program for science.

Reyes and Dizon (2021) highlight the importance of reading comprehension in Science learning, noting that students who struggle with reading are less able to follow procedures, analyze written results, or understand conceptual texts. This aligns with the findings of Tolentino (2021), who observed that learners with low reading levels tend to disengage from science due to difficulty understanding instructions and concepts.

Alcantara (2021) explored how diagnostic assessments help tailor interventions for struggling learners and advocated for the development of subject-specific tools, especially in science. In her study, schools that implemented diagnostic profiling before remediation saw improved student performance and participation in class.

Rivera and Tolosa (2023) examined how RMA and Phil-IRI can be repurposed as indirect indicators of science proficiency. Their results showed that learners with low scores in both assessments consistently underperformed in science, even when provided with standard interventions.

According to the Department of Education (2025), there is still no official diagnostic tool dedicated for Science under the ARAL Program. DepEd has encouraged schools to utilize available tools like Phil-IRI and RMA**,** along with class performance data, to identify target learners who need Science intervention.

Cruz and Jimenez (2023) conducted an action research project demonstrating how targeted intervention based on RMA and Phil-IRI scores helped improve Science engagement and achievement in a Grade 8 class. They concluded that using these tools as a basis for learner profiling is both practical and necessary, especially in resource-limited public schools.

The researcher made use of Grade 7 learners' performance in Mathematics and English using the Rapid Mathematics Assessment (RMA) and the Philippine Informal Reading Inventory (Phil-IRI) to identify proficiency levels, differences in performance, learners at risk of struggling in science, and eligibility for Science ARAL intervention. The researcher aims to answer the following: the level of learners' performance in the Rapid Mathematics Assessment (RMA); the reading level of learners based on the Philippine Informal Reading Inventory (Phil-IRI); the significant difference between learners' performance in the Rapid Mathematics Assessment and Phil-IRI; the percentage of Grade 7 learners considered at risk of struggling in science based on their Mathematics and English performance; and the combined Mathematics and English performance used to predict learners' eligibility for Science ARAL intervention. While these assessments provide useful insights, the absence of a standardized diagnostic tool for Science under the ARAL Program may lead to varied and subjective identification practices. Thus, this study highlights how RMA and Phil-IRI results can be systematically used to support evidence-based learner profiling and guide interventions that address learners' difficulties in science.

METHODOLOGY

Research Design

The study employed a descriptive-correlational research design to identify potential recipients of the Science ARAL Program among Grade 7 students of Langiden National High School. Descriptive statistics were used to summarize learners' performance in Mathematics and English, while correlational and regression analyses examined the relationship between learners' numeracy and reading scores (RMA and Phil-IRI) and their performance on a teacher-made Science assessment. Since no standardized science diagnostic tool was available, the teacher-made test served as a proxy to identify learners who may require science intervention.

Locale of the Study

The research was conducted at Langiden National High School, Langiden, Abra, Philippines. The Department of Education requires schools especially teachers to identify and select the recipients of ARAL using diagnostic tools such as RMA and the Phil-Iri to determine learners who may require interventions.

Participants of the Study

The participants included a total of 30 Grade 7 students with complete RMA and Phil-IRI results, and learners whose scores fell under Not proficient or low proficiency in mathematics or frustration levels in reading were identified as target learners for the Science ARAL Program, ensuring organized and thorough selection.

Instrumentation

The study utilized two primary instruments: the Rapid Mathematics Assessment (RMA)**,** which evaluates learners' numeracy, computation, and problem-solving skills, and the Philippine Informal Reading Inventory (Phil-IRI)**,** which measures reading comprehension, fluency, and decoding skills. While neither tool was specifically designed for science, they serve as indirect indicators of learners' readiness for science learning,

because proficiency in mathematics and reading is essential for understanding scientific concepts, conducting investigations, and interpreting data. The RMA and Phil-IRI thus provide practical, evidence-based measures to identify learners who may require targeted support through the Science ARAL Program.

Data Gathering Procedure

Data collection involved securing approval from the school administration and DepEd authorities to access students' results, organizing and categorizing the data by proficiency levels and percentages, and identifying learners who scored low in mathematics or at the frustration level in reading as potential Science ARAL recipients.

Data Analysis

The study utilized descriptive statistics to summarize learners' performance in Mathematics and English. Frequency counts and percentages for each proficiency level in the Rapid Mathematics Assessment (RMA) and reading level in the Philippine Informal Reading Inventory (Phil-IRI) were calculated using Microsoft Excel. Cross-tabulation of RMA and Phil-IRI results allowed identification of learners who scored low in either or both assessments, facilitating the classification of students at risk of struggling in science. The combined literacy and numeracy results were then used to determine learners' eligibility for the Science ARAL Program, providing a practical, evidence-based approach in the absence of a science-specific diagnostic tool.

Ethical Consideration

The study adhered to ethical standards by ensuring the confidentiality of learners' personal information and assessment results. Approval was obtained from the school administrators and the teacher in charge of administering the assessments. Informed consent was secured from the learners' parents or guardians before data collection. The data were used solely for research purposes to improve learner support, and learners' identities were kept anonymous to avoid any form of disadvantage or labeling.

RESULTS AND DISCUSSION

In this study, the performance of Grade 7 learners in Mathematics and English was presented based on the results of the Rapid Mathematics Assessment (RMA) and the Philippine Informal Reading Inventory (Phil-IRI)**.** The data illustrated learners' proficiency levels and highlight those who may require support under the Science ARAL Program**.** Frequencies and percentages were used to summarize performance, providing a clear picture of literacy and numeracy skills that are essential for success in science learning. This analysis serves as a basis for identifying target learners and guiding evidence-based interventions.

Level of learners' performance in Rapid Mathematics Assessment

Table 1. Mathematics Performance of Grade 7 Learners Based on Rapid Mathematics Assessment (RMA)

Proficiency Level	**Learners**	**Percentage**
Not Proficient	23	76.67%
Low Proficient	7	23.33%
Nearly Proficient	0	0%
Proficient	0	0%
Highly Proficient / At Grade Level	0	0%
Total	30	100%

Most Grade 7 learners are performing below grade-level expectations in mathematics, with 76.67% Not Proficient and 23.33% Low Proficient. This highlights significant gaps in numeracy skills that are essential for performing scientific calculations, interpreting graphs, and analyzing data. Learners' limited ability to solve mathematical problems suggests they are likely to face challenges in science tasks requiring reasoning and computation, supporting previous findings that low mathematics proficiency negatively impacts science learning outcomes (Pascual, 2022; Sarmiento et al., 2024; Bautista, 2022).

Reading level of learners based on Phil-Iri Assessment

Table 2. English Performance of Grade 7 Learners Based on Philippine Informal Reading Inventory (Phil-IRI)

English (Phil-IRI)

Reading Level	**Learners**	**Percentage**
Frustration	30	100%
Instructional	0	0%
Independent	0	0%
Total	30	100%

The data in Table 1 indicate that the majority of Grade 7 learners are performing below grade-level expectations in mathematics, with 76.67% classified as Not Proficient and 23.33% as Low Proficient. This suggests that most learners lack the necessary numeracy skills to perform scientific calculations, interpret graphs, and analyze data effectively. Based on these results, it can be inferred that learners with limited mathematical proficiency are likely to encounter challenges in science tasks that require reasoning and computation, which aligns with existing research showing that low mathematics proficiency negatively impacts science learning outcomes (Pascual, 2022; Sarmiento et al., 2024; Bautista, 2022).

Level of learners' performance in Science Teacher-Made Assessment

Table 3. Science Performance of Grade 7 Learners Based on Teacher-Made Diagnostic Test

Science Score Range	**Interpretation**	**Number of Learners**	**Percentage (%)**
0 – 4	Not Proficient	3	10%
5 – 9	Low Proficient	17	56.7%
10 – 14	Developing/Proficient	9	30%
15 – 17	Proficient	1	3.3%
18 – 20	Highly Proficient	0	0%

The data indicate that the majority of learners performed below grade-level expectations in science, with 56.7% classified as Low Proficient. This suggests that many students experience difficulties in applying higher-order thinking skills, reasoning, and problem-solving in scientific contexts. Only 3.3% of learners achieved the Proficient level, and none reached Highly Proficient. These findings imply that limited literacy and numeracy skills negatively impact science performance, as learners struggle to comprehend instructions, analyze data, and perform the computations necessary for experiments and scientific reasoning (Bautista, 2022; De Vera, 2023).

Relationship Between Mathematics, Reading, and Science Performance

Table 4. Grade 7 learners' performance in RMA, Phil-IRI, and the Science Diagnostic Test.

Assessment	Level / Category	Learners	Percentage (%)
RMA	Not Proficient	23	76.67%
RMA	Low Proficient	7	23.33%
Phil-IRI	Frustration	30	100%
Science Diagnostic	Not Proficient	3	10%
Science Diagnostic	Low Proficient	17	56.7%
Science Diagnostic	Developing/Proficient	9	30%
Science Diagnostic	Proficient	1	3.3%

Learners with low numeracy and literacy are highly likely to struggle in science. Those performing below grade level in both mathematics and reading face compounded challenges, as they must simultaneously interpret instructions, perform calculations, and analyze data. The data show that in the RMA, 76.67% of learners were Not Proficient and 23.33% were Low Proficient, while all learners (100%) were at the Frustration level in the Phil-IRI. In the Science Diagnostic Test, 56.7% were Low Proficient, 30% were Developing/Proficient, 10% were Not Proficient, and only 3.3% reached Proficient, with none achieving Highly Proficient. This pattern indicates that low performance in RMA and Phil-IRI can serve as early indicators of potential difficulties in science learning, highlighting the need for targeted interventions through the ARAL Program to strengthen foundational skills and prepare learners for higher-order thinking in science.

Relationship and Predictive Analysis of RMA, Phil-IRI, and Science Performance

Table 5 Correlation and Regression Between RMA, Phil-IRI, and Science

Variables	Spearman ρ	p-value	Regression β	p-value	Interpretation
RMA – Science	0.85	<0.001	0.85	<0.001	Strong positive – higher numeracy predicts higher science performance
Phil-IRI – Science	N/A	N/A	–	–	Cannot compute – all Phil-IRI scores are the same
RMA – Phil-IRI	N/A	N/A	–	–	Cannot compute – no variation in Phil-IRI

The strong correlation ($\rho = 0.85$) between RMA and Science indicates that learners with higher numeracy skills perform better in science, and regression analysis shows that numeracy explains 72% of the variance in science performance ($\beta = 0.85$, $p < 0.001$, $R^2 = 0.72$). All learners were at the Frustration level in the Phil-IRI, suggesting that reading difficulties may have contributed to low science performance. Although a statistical correlation could not be computed for Phil-IRI due to uniform scores, existing literature confirms that limited reading comprehension further constrains learners' ability to understand scientific concepts, follow procedures, and interpret results (Reyes & Dizon, 2021; Tolentino, 2021). These findings highlight that mathematics proficiency is a key predictor of science performance, while reading challenges likely amplify difficulties, supporting the

use of RMA scores and qualitative reading assessment to identify learners who would benefit from targeted interventions under the Science ARAL Program.

Percentage of Grade 7 learners considered at risk of struggling in science based on their Mathematics and English performance

All 30 Grade 7 learners at Langiden National High School performed below grade level in either Mathematics or English. In the RMA, 23 learners (76.67%) were Not Proficient and 7 learners (23.33%) were Low Proficient, while in the Phil-IRI, all learners (100%) were at the Frustration level. These results suggest that all learners are at risk of struggling in science, highlighting the need for intervention through the Science ARAL Program. This aligns with previous studies showing that low numeracy and literacy skills significantly hinder students' ability to understand scientific concepts, perform investigations, and analyze data (Reyes & Dizon, 2021; Tolentino, 2021; Pascual, 2022; De Vera, 2023). Consequently, the entire cohort may benefit from targeted support to strengthen foundational skills necessary for science learning.

Combined Mathematics and English performance used to predict learners' eligibility for Science ARAL intervention

By combining RMA and Phil-IRI results, learners can be classified according to their risk of needing Science intervention. Those who are Low or Not Proficient in Mathematics or at the Frustration level in English are identified **as** target learners for the Science ARAL Program. Using this approach, all 30 learners (100%) fall into this category, demonstrating that numeracy and literacy performance can effectively serve as indicators for identifying students who require additional support in science. This is consistent with research showing that low literacy and numeracy skills hinder students' ability to understand scientific concepts, follow instructions, and perform investigations (Reyes & Dizon, 2021; Tolentino, 2021; Pascual, 2022; De Vera, 2023).

CONCLUSION

The study revealed that all Grade 7 learners at Langiden National High School performed below grade-level expectations in Mathematics and English, indicating significant challenges in numeracy and literacy skills. These foundational skills are essential for understanding scientific concepts, conducting investigations, and analyzing data, which means deficiencies in mathematics and reading can negatively affect science performance. The Rapid Mathematics Assessment (RMA) and Philippine Informal Reading Inventory (Phil-IRI) effectively identified learners who may benefit from Science ARAL interventions, with all 30 learners falling into the target group for support.

This study has several limitations. The sample size was limited to 30 Grade 7 learners from a single school, which restricts the generalizability of the findings. Additionally, the science diagnostic test used in the study was teacher-made and may not fully represent a standardized science assessment. Future studies should include larger samples across multiple schools and utilize standardized science diagnostic tools to strengthen the evidence regarding the relationship between literacy, numeracy, and science performance.

While this study demonstrates that existing diagnostic tools can serve as preliminary indicators of science learning readiness, the absence of a science-specific assessment limits the ability to quantify the exact relationship between numeracy, literacy, and science achievement. Future studies should include direct measures of science performance, such as final grades or standardized tests, and consider statistical analyses like correlation or regression to determine the predictive value of RMA and Phil-IRI results.

Overall, the findings support using mathematics and reading diagnostic data as part of a systematic approach to select learners for Science ARAL programs. Targeted interventions addressing both literacy and numeracy skills are recommended to improve science comprehension, engagement, and learning recovery, while development of a dedicated science diagnostic tool would enhance the accuracy and objectivity of learner identification.

REFERENCES

1. Alcantara, R. A. (2021). Diagnostic assessment in science education: Basis for targeted remediation. *Philippine Journal of Education and Learning, 45*(3), 122–130.
2. Bautista, L. D. (2022). Numeracy skills and student performance in science investigations. *Southeast Asian Journal of STEM Education, 10*(1), 55–63.
3. Cruz, M. S., & Jimenez, R. T. (2023). Improving science engagement through RMA and Phil-IRI-based profiling. *Journal of Action Research in Education, 8*(2), 100–112.
4. De Vera, J. P. (2023). The impact of reading fluency and vocabulary on science comprehension. *Journal of Language and Science Integration, 6*(1), 23–36.
5. Gonzales, A. R. (2022). Language complexity in science texts: A challenge for struggling readers. *Philippine Literacy Studies, 12*(2), 44–59.
6. Luna, E. V., & Mabunga, R. P. (2020). Integrating literacy into science instruction: Strategies for low-performing schools. *Education for Development Journal, 9*(1), 88–97.
7. Pascual, M. J. (2022). Mathematical ability as a predictor of performance in science problem-solving. *Philippine Journal of Science and Mathematics Education, 5*(2), 77–85.
8. Reyes, M. T., & Dizon, G. C. (2021). The role of reading comprehension in science learning outcomes. *Philippine Journal of Educational Research, 17*(1), 35–46.
9. Rivera, K. F., & Tolosa, B. C. (2023). Using RMA and Phil-IRI to identify science learning gaps. *Action Research Chronicle, 11*(3), 60–72.
10. Sarmiento, V. J., Lopez, H. M., & Santos, L. R. (2024). Numeracy and reasoning in experimental design: A diagnostic perspective. *Journal of Scientific Literacy and Instruction, 7*(1), 91–104.
11. Tolentino, J. D. (2021). Understanding science texts: The struggle of low-reading-level learners. *Literacy and Learning, 4*(2), 17–29.
12. Department of Education. (2025). *Implementation guidelines on the ARAL program for learning recovery*. DepEd Central Office. https://www.deped.gov.ph/