

Early Reading Diagnostics for Precision Literacy Support in Key Stage Learning

Ma. Isabel G. Dacquil and Alma P. Gonzales

¹Northeastern College

*maisabelgalinggana15@gmail.com, ²almagonzales@northeasterncollege.edu.ph

Date Submitted:

March 15, 2026

Date Accepted:

July 18, 2026

Date Published:

September 24, 2026

DOI:

10.5281/zenodo.22927719

ABSTRACT

This study addressed the need for more precise identification of early reading difficulties among Key Stage 1 learners by determining distinct literacy profiles and translating diagnostic results into targeted instructional support. A cross-sectional person-centered diagnostic mapping design was employed among 150 Grade 1 to Grade 3 learners in Santa Maria, Isabela, selected through grade-balanced stratified random sampling. Data were gathered using an Early Reading Diagnostic Battery covering phonological awareness, decoding, word recognition, oral reading fluency, and reading comprehension. Descriptive statistics, Latent Profile Analysis, and Classification and Regression Tree analysis were applied. Results revealed that reading comprehension registered the lowest overall percentage performance at 63.53%, while substantial

variability was observed in oral reading fluency. Latent Profile Analysis produced four distinct groups: Foundational Support, 23.3%; Fluency Support, 28.7%; Meaning-Making Support, 20.7%; and Consolidated Readers, 27.3%. Overall, 72.7% of the learners belonged to profiles requiring targeted literacy assistance. The four-profile model demonstrated strong classification quality with an entropy value of .91. CART analysis achieved 87.3% classification accuracy, with decoding emerging as the strongest distinguishing variable, followed by comprehension and oral reading fluency. The findings indicate that early reading difficulties cannot be adequately addressed through uniform remediation. Skill-specific diagnostic information can provide a stronger basis for matching learners with appropriate foundational, fluency, or comprehension interventions and for strengthening precision literacy support during the early years of schooling.

Keywords: *decoding, diagnostic assessment, early literacy, Key Stage 1, precision literacy support, reading profiles*

INTRODUCTION

Reading in the early grades provides the foundation for learning across subjects because children rely increasingly on written language as they move through school. When difficulties in word recognition, fluency, vocabulary, or comprehension remain unnoticed, learners may enter later grades without the skills needed to engage fully with more demanding texts. This concern is particularly important in the Philippines. The *Philippines Learning Poverty Brief* reported that 91 percent of Filipino children at late primary age were not proficient in reading, based on the data used for the 2022 estimate (World Bank & UNESCO Institute for Statistics, 2022). The figure points to the value of identifying reading difficulties before they become persistent barriers to learning.

Early reading assessment becomes more useful when it identifies the particular skills that require support rather than merely classifying a learner as a strong or weak reader. Evidence from curriculum-based measurement shows that assessing foundational skills during the early years can help identify children who may need more intensive instruction before reading difficulties become firmly established (Gutiérrez et al., 2020). Reading risk

also cannot always be explained by a single measure. Screening that considers both decoding and language-related abilities has demonstrated strong accuracy in identifying learners who may later experience comprehension difficulties (Silverman et al., 2021). These findings support a diagnostic approach in which assessment results are used to locate specific areas of need and guide corresponding literacy responses.

The value of diagnosis, however, depends on what teachers do with the information gathered. Philippine research on formative assessment emphasizes that assessment becomes instructionally meaningful when teachers elicit evidence of learning and use that evidence to shape subsequent teaching decisions (Cagasan et al., 2020). At the system level, the Department of Education continues to assess Key Stage 1 proficiency through the Early Language, Literacy, and Numeracy Assessment, which measures whether learners have attained expected standards in language, literacy, and numeracy (Department of Education, 2025). While such assessment provides an important picture of achievement at the end of the key stage, classroom-level diagnostics can offer more immediate information about which reading skills need attention and what form of support may be most appropriate for individual learners.

For schools in Santa Maria, Isabela, this need makes early reading diagnosis a practical area of inquiry. Early Reading Diagnostics for Precision Literacy Support in Key Stage Learning examines how evidence about learners' reading performance may be translated into more focused literacy support during the formative years of schooling. By linking diagnostic information with instructional response, the study gives attention not only to identifying reading difficulties, but also to how teachers can use assessment evidence to provide support that is timely, skill-specific, and responsive to learners' actual needs.

Literature Review

Early Reading Diagnostic Assessment

Early reading diagnosis serves a broader purpose than determining whether a child can or cannot read at an expected level. Its value lies in identifying which reading processes require attention so that instruction can be adjusted before difficulties become more established. Research on the science of reading supports early identification of learners at risk and the use of evidence from reading performance to guide appropriate instructional decisions (Petscher et al., 2020). Effective assessment should therefore examine specific competencies rather than rely on a single overall reading score. Evidence-based guidance for the primary grades likewise identifies oral language, phonological awareness, decoding, word recognition, and connected-text reading as important areas for examining early literacy development (Foorman et al., 2016). These areas provide a useful basis for diagnostic practices that distinguish individual strengths from specific learning needs and allow teachers to plan support with greater precision.

Foundational Reading Skills and Reading Development

Accurate diagnosis requires a clear understanding of the skills that contribute to successful reading. Ehri (2020) explained that beginning readers develop word-reading ability by learning connections between graphemes and phonemes, acquiring decoding skills, and gradually storing written words in memory for more automatic recognition. Weakness in these processes may limit fluency and make comprehension more demanding for young learners. Reading development, however, extends beyond accurate word recognition. Duke et al. (2021) emphasized that comprehension begins developing early and depends on the interaction of word reading, fluency, vocabulary, knowledge, language, and purposeful engagement with text. For Key Stage 1 learners, diagnostic assessment should therefore capture more than isolated reading accuracy. Examining different components of literacy can help teachers determine whether a learner needs support in decoding, fluency, language, comprehension, or a combination of these areas.

Precision and Differentiated Literacy Support

Learners who appear similar in overall reading achievement may have different instructional needs, making uniform remediation less suitable for early literacy support. Connor et al. (2022) demonstrated the value of linking assessment information with individualized instruction through an assessment-to-instruction approach that considered learners' vocabulary, decoding, and comprehension skills. Their findings support the principle that instructional decisions become more responsive when they are based on identified patterns of literacy performance. Evidence from reading interventions for learners in kindergarten through Grade 2 also indicates that structured interventions can produce gains across foundational skills, fluency, comprehension, and oral language, although outcomes vary according to the intervention and skill being addressed (Roberts et al., 2022). Precision literacy support thus requires a close match between the difficulty identified through diagnosis and the instructional response provided to the learner.

Data-Based Intervention and Progress Monitoring

Diagnostic assessment becomes more useful when it forms part of a continuing cycle of instruction, monitoring, and adjustment. A meta-analysis by Jung et al. (2018) found positive effects of data-based individualization for learners with intensive academic needs, showing that teachers can improve instructional decisions by examining performance data and modifying interventions when progress is insufficient. This principle is especially relevant to beginning reading because early literacy difficulties can differ in severity and may require varying levels of instructional intensity. Graham and Kelly (2019) similarly found that early-grade reading interventions generally improved literacy outcomes across diverse settings, while noting that short interventions do not automatically produce fluent readers. These findings suggest that precision support should not end after the initial diagnosis. Teachers need continuing evidence of learner progress to determine whether support should be maintained, intensified, modified, or gradually withdrawn.

METHODS

Research Design

The study employed a cross-sectional person-centered diagnostic mapping design. Rather than treating early reading performance as a single overall score, the design examined patterns across several foundational reading skills and grouped learners according to similar diagnostic characteristics. This approach suited the study because its purpose was to identify distinct reading needs that could serve as the basis for precision literacy support. Direct reading measures were administered individually, and the resulting skill patterns were analyzed through latent profile modeling. The design therefore moved from simple measurement toward the identification of meaningful learner profiles that could guide differentiated intervention.

Research Locale

The study was conducted in Santa Maria, Isabela, a municipality in the province of Isabela under Region II. The Philippine Statistics Authority recorded a population of 25,919 for Santa Maria in the 2024 Census of Population (Philippine Statistics Authority, 2025). Available Department of Education enrollment records also documented a sizeable public elementary learner population in the municipality, supporting the selection of Key Stage 1 learners as the study population. The locale was appropriate because the study focused on the use of early reading evidence to identify specific literacy needs during the first three years of elementary education.

Participants and Sampling Technique

The participants consisted of 150 Key Stage 1 learners, with 50 learners each from Grades 1, 2, and 3. This number was kept manageable because the assessment required individual oral administration rather than group questionnaire completion. A grade-balanced stratified random sampling technique was used. Current Grade 1 to Grade 3 class lists served as the sampling frames, after which eligible learners were randomly selected within

each grade stratum. Equal allocation was used so that one grade level would not dominate the diagnostic profiles produced by the analysis.

Research Instrument

Data were gathered using a researcher-adapted Early Reading Diagnostic Battery designed to assess five areas of beginning reading: phonological awareness, decoding, word recognition, oral reading fluency, and reading comprehension. The tasks were structured according to the assessment principles of the Early Grade Reading Assessment and were adjusted to match the expected reading demands of Key Stage 1 learners.

The instrument underwent content validation by five specialists in early literacy, language education, educational measurement, and research methodology. The item-level Content Validity Index ranged from 0.80 to 1.00, while the Scale-level Content Validity Index using the average method was 0.94, indicating strong agreement among the validators regarding relevance, clarity, and developmental appropriateness. Revisions were made to several instructions and reading prompts based on the validators' recommendations.

A pilot test was conducted with 30 Key Stage 1 learners who were excluded from the main sample. The complete diagnostic battery obtained an overall Cronbach's alpha of 0.91, indicating excellent internal consistency. The reliability coefficients were 0.86 for phonological awareness, 0.88 for decoding, 0.85 for word recognition, 0.89 for oral reading fluency, and 0.87 for reading comprehension. McDonald's omega for the complete battery was 0.92, providing additional evidence of score reliability. For independently scored oral reading responses, inter-rater agreement produced an intraclass correlation coefficient of 0.96, indicating excellent scoring consistency. No item was removed after pilot testing because corrected item-total correlations ranged from 0.42 to 0.76, demonstrating acceptable contribution of all retained items to their respective reading domains. The final instrument was therefore considered sufficiently valid and reliable for the main data collection.

Data Gathering

Permission to conduct the study was secured from the appropriate education authorities before data collection. Parental consent and learner assent were obtained prior to participation. The researcher coordinated the assessment schedule so that regular classroom activities were minimally disrupted. Each learner was assessed individually in a quiet area using the same administration instructions, timing procedures, and stopping rules. Responses were recorded immediately on individual scoring sheets. Oral reading accuracy, correct words per minute, decoding performance, and comprehension scores were encoded after each administration. Completed records were checked against the original scoring sheets before statistical processing to reduce encoding errors.

Data Analysis

The analysis followed a person-centered diagnostic classification procedure. Raw scores for each reading domain were first summarized using the mean, standard deviation, median, and score distribution. Because expected reading performance differed across Grades 1 to 3, domain scores were standardized within grade before multivariate analysis. Latent Profile Analysis (LPA) was then used to identify naturally occurring reading profiles based on the learners' combined performance in phonological awareness, decoding, word recognition, fluency, and comprehension. Models containing different numbers of profiles were compared using the Bayesian Information Criterion, sample-size adjusted Bayesian Information Criterion, bootstrap likelihood ratio test, and entropy. The solution that demonstrated the best statistical fit and clear instructional meaning was retained. A Classification and Regression Tree analysis was subsequently applied to determine which reading skills and score combinations most clearly distinguished the identified profiles. This second-stage analysis translated the statistical profiles into practical diagnostic pathways for precision literacy support rather than relying solely on overall reading averages.

Ethical Considerations

The study observed informed consent, learner assent, confidentiality, voluntary participation, and the right to discontinue participation without penalty. Learner names were replaced with identification codes, individual diagnostic results were not disclosed publicly, and electronic records were stored in password-protected files accessible only to the researcher. Reading results were used for research and educational support purposes and were not used to stigmatize, rank, or disadvantage participating learners.

RESULTS AND DISCUSSION

Table 1. *Diagnostic Reading Performance of Key Stage 1 Learners by Grade Level*

Reading Domain	Grade 1 M ± SD	Median	Grade 2 M ± SD	Median	Grade 3 M ± SD	Median	Overall M ± SD	Median
Phonological awareness (%)	68.20 ± 15.40	70.00	79.50 ± 12.80	81.00	87.30 ± 10.10	89.00	78.33 ± 14.82	81.00
Decoding (%)	57.60 ± 17.90	59.00	70.40 ± 16.20	72.00	82.10 ± 13.80	84.00	70.03 ± 18.30	72.00
Word recognition (%)	60.80 ± 17.20	62.00	73.60 ± 15.50	75.00	84.40 ± 12.70	86.00	72.93 ± 17.62	75.00
Oral reading fluency (CWPM)	29.80 ± 14.10	28.00	47.50 ± 17.00	46.00	65.90 ± 18.60	64.00	47.73 ± 22.10	46.00
Reading comprehension (%)	50.60 ± 20.40	50.00	64.80 ± 18.70	67.00	75.20 ± 16.90	78.00	63.53 ± 20.52	66.00

Note. CWPM = correct words per minute. n = 50 for each grade level; N = 150.

Table 1 presents a clear progression in reading performance from Grade 1 to Grade 3, but it also reveals areas that required instructional attention. Phonological awareness showed the strongest overall performance at 78.33%, while decoding registered a lower mean of 70.03%. Reading comprehension produced an overall mean of 63.53%, indicating that a substantial portion of the learners experienced difficulty constructing meaning even when some foundational skills were already developing. Oral reading fluency also showed considerable variation, with an overall mean of 47.73 correct words per minute and a relatively large standard deviation of 22.10. The distance between grade-level means was expected developmentally, yet the wide variation within grades suggested that chronological grade placement alone did not adequately describe learners' reading needs. This pattern supported the need for a diagnostic approach that separated skill-specific difficulties rather than assigning learners a single general reading level. Reading development involves movement from alphabetic decoding toward increasingly automatic word recognition and text comprehension, and weaknesses at different points in this progression require different forms of instruction (Castles et al., 2018).

Table 2. *Latent Profile Model Fit Statistics*

Number of Profiles	AIC	BIC	SSA-BIC	Entropy	BLRT p-value	Smallest Profile, n
2	3562.40	3664.70	3555.80	.79	< .001	42
3	3379.20	3517.60	3370.30	.86	< .001	31
4	3266.80	3441.40	3255.60	.91	< .001	31
5	3258.10	3468.80	3244.60	.83	.087	9

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SSA-BIC = sample-size adjusted Bayesian Information Criterion; BLRT = bootstrap likelihood ratio test.

Table 2 shows that the four-profile model provided the most defensible representation of the diagnostic data. The model yielded an entropy value of .91, indicating clear separation among the identified learner groups.

Although the five-profile model produced a slightly lower AIC, its BIC increased to 3468.80, entropy declined to .83, and the additional profile contained only nine learners. The bootstrap likelihood ratio test for the five-profile solution was also nonsignificant at $p = .087$. These results indicated that adding a fifth profile contributed little meaningful distinction. The four-profile solution was therefore retained because it combined strong statistical fit, classification accuracy, sufficient profile size, and clear instructional interpretation.

Table 3. *Reading Characteristics and Distribution of the Four Latent Profiles*

Reading Indicator	Profile 1 Foundational Support	Profile 2 Fluency Support	Profile 3 Meaning-Making Support	Profile 4 Consolidated Readers
Phonological awareness, z	-1.12	-0.21	0.22	0.84
Decoding, z	-1.28	-0.15	0.25	0.90
Word recognition, z	-1.20	-0.12	0.23	0.92
Oral reading fluency, z	-1.08	-0.66	0.31	0.88
Reading comprehension, z	-0.98	-0.28	-0.72	0.94
Grade 1, n	19	17	8	6
Grade 2, n	10	15	12	13
Grade 3, n	6	11	11	22
Total, n	35	43	31	41
Percentage	23.3%	28.7%	20.7%	27.3%

Note. Profile scores were standardized within grade prior to latent profile analysis.

Table 3 presents four distinct patterns of early reading performance. Profile 1, Foundational Support, contained 35 learners or 23.3% of the sample. These learners performed below their grade peers across all five domains, with the largest weakness found in decoding at $z = -1.28$. Their difficulty was therefore broader than slow reading alone and pointed to a need for systematic work on sound-symbol relationships, decoding, word recognition, and supported text reading.

The largest group was Profile 2, Fluency Support, comprising 43 learners or 28.7%. Their phonological awareness, decoding, and word recognition scores were relatively closer to grade expectations, but oral reading fluency remained distinctly weaker at $z = -0.66$. This pattern suggested that many learners could process written words with reasonable accuracy but had not developed sufficient automaticity for smooth and efficient reading. Instruction for this group would benefit more from repeated oral reading, phrased reading, and structured practice with connected text than from restarting basic phonological instruction.

Profile 3, Meaning-Making Support, included 31 learners or 20.7%. Their decoding, word recognition, and fluency scores were above the grade-standardized mean, yet comprehension fell to $z = -0.72$. This finding was important because these learners could easily have been considered proficient if assessment had stopped at oral reading accuracy or fluency. Their pattern showed that being able to read words did not necessarily mean that meaning was successfully constructed from text. The distinction between word recognition processes and language comprehension provides a strong basis for treating such difficulties separately rather than placing all struggling readers under the same intervention (Hoover & Tunmer, 2018).

Profile 4, Consolidated Readers, consisted of 41 learners or 27.3% and demonstrated positive standardized scores across all domains. The strongest performance appeared in comprehension at $z = 0.94$ and word recognition at $z = 0.92$. However, the more important result was that 109 of the 150 learners, or 72.7%, belonged to one of the three profiles requiring a specific form of literacy support. The findings therefore revealed a genuine instructional concern while also showing that the difficulty was not uniform. Some learners required foundational rebuilding, others needed greater fluency, and another group primarily required comprehension support.

Table 4. *CART Decision Rules for Classifying Learners and Matching Literacy Support*

Diagnostic Rule	Predicted Profile	Cases Classified	Correctly Classified	Classification Purity	Priority Literacy Support
Decoding $z \leq -0.67$	Foundational Support	36	32	88.9%	Explicit phonological work, decoding, word building, controlled text practice
Decoding $z > -0.67$ and fluency $z \leq -0.38$	Fluency Support	45	39	86.7%	Repeated reading, phrase reading, modeled oral reading, automatic word recognition
Decoding $z > -0.67$, fluency $z > -0.38$, and comprehension $z \leq -0.43$	Meaning-Making Support	30	25	83.3%	Vocabulary, oral language, questioning, retelling, inferential comprehension
Decoding $z > -0.67$, fluency $z > -0.38$, and comprehension $z > -0.43$	Consolidated Readers	39	35	89.7%	Enriched texts, independent reading, higher-level comprehension tasks
Overall		150	131	87.3%	

Note. Ten-fold cross-validated classification accuracy = 84.0%; Cohen's κ = .83.

Table 4 translates the latent profiles into a simpler diagnostic pathway that could be used for instructional decision-making. The CART model correctly classified 131 of 150 learners, producing an overall accuracy of 87.3%. Accuracy remained 84.0% under ten-fold cross-validation, indicating that the decision structure was not dependent solely on the original sample. Cohen's κ of .83 further indicated strong agreement between the CART classifications and the latent profile assignments.

Decoding emerged as the strongest splitting variable, with a normalized importance score of 100, followed by comprehension at 84, oral reading fluency at 78, word recognition at 56, and phonological awareness at 39. The resulting tree was instructional rather than merely descriptive. A learner with pronounced decoding weakness was directed toward foundational support, while a learner with adequate decoding but weak fluency was assigned a different instructional pathway. Learners who decoded and read connected text adequately but showed weak comprehension were separated into a meaning-making pathway.

The combined findings provide the central result of the study. Early reading difficulty among Key Stage 1 learners was not represented by one common pattern. Instead, the diagnostic data revealed three different forms of literacy need alongside a consolidated reading group. The four-profile solution achieved strong statistical separation, while the CART model converted those profiles into an efficient set of decision rules. Precision literacy support could therefore be based on the learner's dominant area of difficulty rather than on grade level or an overall reading score alone. This offered a practical link between early diagnosis and targeted instruction, which formed the central purpose of the study.

CONCLUSION

Early reading difficulties among Key Stage 1 learners were varied rather than uniform, as shown by the emergence of distinct profiles requiring foundational, fluency, and meaning-making support, alongside learners who demonstrated consolidated reading skills. The findings further indicated that decoding, oral reading fluency, and comprehension served as important diagnostic markers for identifying the type of literacy assistance each learner needed. Based on these results, schools should strengthen the use of skill-specific early reading diagnostics and avoid relying solely on general reading scores or grade-level placement when planning intervention. Teachers may use structured diagnostic pathways to match learners with appropriate support such as explicit decoding

instruction, repeated and modeled reading, vocabulary development, retelling, and comprehension-focused activities. Re

References

- Cagasan, L., Care, E., Robertson, P., & Luo, R. (2020). Developing a formative assessment protocol to examine formative assessment practices in the Philippines. *Educational Assessment*, 25(4), 259–275.
- Castles, A., Rastle, K., & Nation, K. (2018). Ending the reading wars: Reading acquisition from novice to expert. *Psychological Science in the Public Interest*, 19(1), 5–51. <https://doi.org/10.1177/1529100618772271>
- Connor, C. M., May, H., Sparapani, N., Hwang, J. K., Adams, A., Wood, T. S., Siegal, S., Wolfe, C., & Day, S. (2022). Bringing Assessment-to-Instruction (A2i) technology to scale: Exploring the process from development to implementation. *Journal of Educational Psychology*, 114(7), 1495–1532.
- Department of Education. (2025). *DepEd Memorandum No. 087, s. 2025: Administration of the Early Language, Literacy, and Numeracy Assessment for School Year 2025–2026*.
- Duke, N. K., Ward, A. E., & Pearson, P. D. (2021). The science of reading comprehension instruction. *The Reading Teacher*, 74(6), 663–672.
- Ehri, L. C. (2020). The science of learning to read words: A case for systematic phonics instruction. *Reading Research Quarterly*, 55(S1), S45–S60.
- Foorman, B., Beyler, N., Borradaile, K., Coyne, M., Denton, C. A., Dimino, J., Furgeson, J., Hayes, L., Henke, J., Justice, L., Keating, B., Lewis, W., Sattar, S., Streke, A., Wagner, R., & Wissel, S. (2016). *Foundational skills to support reading for understanding in kindergarten through 3rd grade*. National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education.
- Graham, J., & Kelly, S. (2019). How effective are early grade reading interventions? A review of the evidence. *Educational Research Review*, 27, 155–175.
- Gutiérrez, N., Jiménez, J. E., de León, S. C., & Seoane, R. C. (2020). Assessing foundational reading skills in kindergarten: A curriculum-based measurement in Spanish. *Journal of Learning Disabilities*, 53(2), 145–159.
- Hoover, W. A., & Tunmer, W. E. (2018). The simple view of reading: Three assessments of its adequacy. *Remedial and Special Education*, 39(5), 304–312. <https://doi.org/10.1177/0741932518773154>
- Jung, P. G., McMaster, K. L., Kunkel, A. K., Shin, J., & Stecker, P. M. (2018). Effects of data-based individualization for students with intensive learning needs: A meta-analysis. *Learning Disabilities Research & Practice*, 33(3), 144–155.
- Petscher, Y., Cabell, S. Q., Catts, H. W., Compton, D. L., Foorman, B. R., Hart, S. A., Lonigan, C. J., Phillips, B. M., Schatschneider, C., Steacy, L. M., Terry, N. P., & Wagner, R. K. (2020). How the science of reading informs 21st-century education. *Reading Research Quarterly*, 55(S1), S267–S282.
- Philippine Statistics Authority. (2025). *2024 Census of Population: Municipality of Santa Maria, Isabela*. Philippine Statistics Authority.
- Roberts, G. J., Hall, C., Cho, E., Côté, B., Lee, J., Qi, B., & Van Ooyik, J. (2022). The state of current reading intervention research for English learners in grades K–2: A best-evidence synthesis. *Educational Psychology Review*, 34(1), 335–361.
- RTI International. (2016). *Early Grade Reading Assessment (EGRA) toolkit* (2nd ed.). United States Agency for International Development.
- Silverman, R. D., McNeish, D., Speece, D. L., & Ritchey, K. D. (2021). Early screening for decoding- and language-related reading difficulties in first and third grades. *Assessment for Effective Intervention*, 46(2), 99–109.
- World Bank & UNESCO Institute for Statistics. (2022). *Philippines learning poverty brief*. World Bank.