

Mechanisms and Strategies for Addressing Foundational Gaps in Reading, Writing, and Arithmetic

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ABSTRACT

This study investigates the mechanisms and strategies employed by teachers and students to address learning gaps and losses in reading, writing, and arithmetic (3Rs), focusing on four domains critical to foundational learning: infrastructure availability, pedagogical approaches, teacher competencies, and teacher support. Drawing on quantitative data from 287 teachers and 381 students from 54 public elementary schools under the Division of Lanao del Sur I. The study reveals notable disparities between teacher-reported access to instructional resources and students' actual experiences, particularly in technology availability and digital integration. While teachers generally indicated adequate access to instructional materials, conducive learning environments, and supportive administrative systems, students reported substantial limitations in device access, unstable internet connectivity, and insufficient training in educational technologies. Pedagogically, teachers and students both identified strengths in active learning strategies, real-life applications, and lesson organization; however, gaps persisted in differentiated instruction, consistency of feedback, and technology integration. Teacher competencies in curriculum understanding, instructional delivery, collaboration, and reflective practice were rated positively, though the need for ongoing professional development remains evident. The findings underscore the importance of systemic interventions to strengthen technological infrastructure, enhance teacher capacity-building, and improve pedagogical responsiveness in addressing learning recovery. Recommendations highlight the need for equitable resource distribution, targeted training programs, and strengthened support systems to ensure effective remediation of learning gaps in the foundational 3Rs.

Keywords: learning gaps, learning losses, reading, writing, arithmetic (3Rs), pedagogical approaches, teacher competencies, infrastructure availability, teacher support, digital access, formative assessment, foundational skills, learning recovery, basic education

INTRODUCTION

Learning gaps in foundational literacy and numeracy have emerged as a significant educational concern, intensified by disruptions in traditional schooling and long-standing inequities in resource distribution. Foundational skills in reading, writing, and arithmetic (3Rs) function as gateways to higher-order learning, making it imperative to examine the systems and strategies that enable or hinder their development. Schools operate within complex environments shaped by the availability of infrastructure, teachers' pedagogical competence, the effectiveness of instructional approaches, and the quality of teacher-student interactions. These factors collectively determine the extent to which learning gaps can be addressed or exacerbated.

The data from the attached study provides a comprehensive view of how teachers and students perceive the mechanisms available to support learning recovery. Teachers reported generally favorable access to teaching materials, supportive administration, and conducive learning environments. Nevertheless, technological limitations, including insufficient devices, inconsistent internet connectivity, and limited access to digital learning tools, emerged as persistent concerns. Students, in contrast, revealed a more challenging reality, experiencing significant barriers in technology access, digital training, and integration of online tools into daily instruction.

Pedagogical practices were generally viewed positively, with both groups acknowledging the use of engaging lessons, active learning, and real-life examples. However, the inconsistencies in differentiated instruction, formative assessment practices, and timely feedback suggest the need for more robust and consistent pedagogical implementation. Additionally, while teachers demonstrated strong competencies in content knowledge, curriculum understanding, and classroom management, sustained professional development, particularly in technology-enhanced instruction, remains essential. Understanding these dynamics is crucial for informing policy, guiding school-level interventions, and strengthening instructional practices aimed at mitigating learning losses. This study seeks to contribute to the discourse on learning recovery by identifying strengths, gaps, and actionable steps that can enhance the effectiveness of mechanisms addressing the 3Rs in basic education.

METHODOLOGY

This research utilized a quantitative descriptive design to examine the mechanisms and strategies used to address learning gaps and losses in reading, writing, and arithmetic. The study focused on four major domains: infrastructure availability, pedagogical approaches, teacher competencies, and teacher support. The study involved two groups of respondents who provided complementary perspectives on foundational learning, with 287 teachers representing various grade levels and 381 students from diverse demographic backgrounds. Data was collected using a structured survey designed to assess key aspects of the learning environment and instructional practices. The survey examined the availability and accessibility of learning materials, digital tools, and physical infrastructure, as well as the frequency and effectiveness of pedagogical practices. It also evaluated teacher competencies in instruction, assessment, collaboration, and reflective practice, alongside the level of teacher support in terms of motivation, clarity of instruction, and accessibility for assistance.

In addition, student access to technology, the integration of digital tools, and training in technological skills were assessed. Likert-type rating scales were employed for each construct to ensure accurate measurement of respondents' perceptions and experiences.

Data Collection and Analysis

Survey questionnaires were administered through schools, ensuring confidentiality and voluntary participation. Completed responses were tabulated and analyzed using descriptive statistics. Data was analyzed using descriptive statistical techniques to capture patterns in teacher and student responses. The mode was employed to identify the most frequently selected rating for each indicator, while frequency and percentage distributions were used to determine prevailing trends and highlight notable disparities across groups. Narrative interpretations were then developed to explain emerging patterns and provide contextual insights into the results. This analytic approach facilitated a comprehensive understanding of how infrastructure availability, teacher competencies, pedagogical practices, and support mechanisms collectively influence efforts to address learning gaps.

RESULTS

The analysis of mechanisms and strategies employed to address learning gaps and losses in the 3Rs (Reading, Writing, and Arithmetic) highlights both strengths and areas for improvement across three key domains: infrastructure availability, pedagogical approaches, and teacher support.

A. Teachers as Respondents

Table 1 Ratings of Teachers on Mechanisms and Strategies for Addressing Learning Gaps and Losses in Infrastructure Availability

Indicators	Responses (<i>n</i> =287)					Mode	Qualitative Description
	SD	D	N	A	SA		
¹ I have access to adequate teaching materials and resources to support instruction in the 3Rs.	0	2	47	173	65	A	Agree

Sufficient technological resources (computers, projectors, software) are available to enhance instruction in the 3Rs.	7	27	100	108	45	A	Agree
³ Adequate support services (tutors, special education) are available to address learning gaps in the 3Rs.	2	21	83	130	51	A	Agree
⁴ The school provides a conducive learning environment that supports student engagement in reading, writing, and arithmetic.	3	7	41	173	63	A	Agree
⁵ There is sufficient support from the administration to address any infrastructure challenges related to teaching the 3Rs.	5	8	49	160	65	A	Agree
⁶ I can adapt to any limitations in resources by using innovative strategies to ensure effective instruction in the 3Rs.	0	5	51	178	53	A	Agree
⁷ Learning resources for the 3Rs are easily accessible to both teachers and students	1	3	71	142	70	A	Agree

Note. SD=Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree

The table reflects teachers’ perceptions of infrastructure availability and its role in addressing learning gaps in the 3Rs (Reading, Writing, Arithmetic). It was shown in the table that 83% of teachers either agreed (173) or strongly agreed (65) that they have adequate teaching materials, which suggests that most teachers feel well-supported with physical resources, but the 17% who were neutral (47) or disagreed (2) indicate gaps in resource distribution. In terms of technological resources, only 53% of teachers agreed (108) or strongly agreed (45) that technological resources were sufficient, while 37% were neutral (100), 12% disagreed (7 strongly disagreed, 27 disagreed), implying limited access to technology could hinder effective instruction and innovation in teaching the 3Rs.

While Support Services, 63% of teachers agreed (130) or strongly agreed (51) about the adequacy of support services, but 29% were neutral (83), and 8% disagreed. While many perceive support services positively, the highly neutral responses suggest variability in service availability or effectiveness. Meanwhile, 82% of teachers agreed (173) or strongly agreed (63) that their school provides a conducive learning environment, while 14% were neutral or disagreed. This implies that most teachers appreciate the school environment, but areas for improvement may exist in creating inclusive and engaging learning spaces. However, 78% of teachers agreed (160) or strongly agreed (65) that administrative support is sufficient, with 5% disagreeing. This implies that administrative support is generally adequate, but addressing concerns from the small percentage of dissenting teachers is important for morale.

Furthermore, 80% of teachers agreed (178) or strongly agreed (53) that they can adapt to resource limitations, while 20% were neutral or disagreed. This suggests that teachers’ adaptability is commendable but highlights the need for more consistent resource availability to minimize reliance on such adjustments. In addition, 74% of teachers agreed (142) or strongly agreed (70) that learning resources are accessible, while 26% were neutral or disagreed, suggesting that accessibility remains an issue for some teachers, potentially due to geographic or logistical barriers.

The findings align with global challenges in educational infrastructure. Research by the World Bank (2019) highlights that adequate infrastructure significantly improves learning outcomes. However, disparities in resource allocation can exacerbate educational inequities (World Bank, 2019). Another study by UNESCO (2022)

emphasizes the role of digital tools in addressing foundational learning gaps. The study found that schools with access to modern technology achieved better results in literacy and numeracy (UNESCO, 2022).

Table 2 Ratings of Teachers on Mechanisms and Strategies for Addressing Learning Gaps and Losses on Pedagogical Approaches

Indicators Pedagogical Approaches	Responses (<i>n</i> =287)					Mode	Qualitative Description
	N	R	S	O	A		
¹ I align my teaching strategies with the curriculum to address learning gaps in reading, writing, and arithmetic.	0	0	20	94	173	A	Agree
² I regularly use diverse teaching strategies to address different learning styles in reading, writing, and arithmetic.	0	0	16	130	141	A	Agree
³ I incorporate interactive learning activities to engage students in reading, writing, and arithmetic.	0	1	23	115	148	A	Agree
⁴ I integrate technology effectively to enhance instruction in the 3Rs.	3	18	82	115	69	O	Often
⁵ I implement differentiated instructions to meet the individual needs of my students in reading, writing, and arithmetic.	0	2	31	139	115	O	Often
⁶ I incorporate formative assessments to guide my instructional decisions for the 3Rs.	0	1	27	143	116	O	Often
⁷ I utilize a variety of assessment techniques to identify and address learning gaps in the 3Rs.	0	6	40	125	116	O	Often
⁸ I engage students in active learning activities that promote critical thinking and problem-solving in the 3Rs.	2	2	19	133	131	O	Often
⁹ I provide timely feedback and additional support to students struggling with reading, writing, and arithmetic.	0	0	20	121	146	A	Agree

Note. N=Never, R=Rarely, S=Sometimes, O=Often, A=Always

Table 2 provides insights into teachers' pedagogical approaches to addressing learning gaps in the 3Rs. The findings indicate that most teachers align their teaching strategies with the curriculum, with 94 teachers responding "Often" and 173 selecting "Always," resulting in a mode of "Agree." Similarly, teachers regularly use diverse strategies to cater to varying learning styles, with 141 selecting "Always" and 130 selecting "Often." Interactive learning activities were also highly rated, with 148 teachers responding "Always," suggesting that engagement strategies are widely employed.

Technology integration received a more moderate response, with "Often" being the mode. Specifically, 82 teachers responded "Sometimes," and 115 selected "Often," highlighting variability in access or effectiveness of technology in teaching the 3Rs. Differentiated instruction and the use of formative assessments both had a mode of "Often," with 139 and 143 responses, respectively, indicating that these practices are employed consistently but not universally. A similar trend was observed for the use of varied assessment techniques and active learning activities, where the mode was "Often," reflecting a general implementation of these methods with room for broader adoption. Lastly, the provision of timely feedback was strongly affirmed, with a mode of "Agree," as 146 teachers selected "Always" and 121 selected "Often."

The implications of these findings suggest that while teachers are incorporating diverse pedagogical approaches to addressing learning gaps, there is variability in the frequency and depth of these practices. Technology integration, in particular, appears to be an area needing further investment and support. Additionally, the

consistent use of formative assessments and active learning strategies reflects a positive trend toward addressing individual student needs but underscores the need for broader and more consistent implementation.

Research supports the importance of these approaches. A study by Hattie (2018) emphasized the effectiveness of formative assessments and timely feedback in improving student outcomes, while research by Mishra and Koehler (2020) highlights the transformative potential of integrating technology into education. To enhance the consistency and effectiveness of these practices, recommendations include increasing access to digital resources, providing professional development focused on differentiated instruction and active learning strategies, and fostering a culture of innovation in teaching methodologies.

Table 3 Ratings of Teachers on Mechanisms and Strategies for Addressing Learning Gaps and Losses in Teacher Competencies

Indicators Teacher Competencies	Responses (n=287)					Mode	Qualitative Description
	N	R	S	O	A		
¹ I possess comprehensive knowledge of reading, writing, and arithmetic content.	0	0	24	160	103	O	Often
² I have a strong understanding of the curriculum requirements for teaching reading, writing, and arithmetic.	0	0	19	163	105	O	Often
³ I effectively apply instructional skills to teach reading, writing, and arithmetic.	0	0	16	147	124	O	Often
⁴ I am confident in my ability to effectively assess student progress in the 3Rs.	0	2	25	156	104	O	Often
⁵ I regularly seek professional development opportunities to improve my reading, writing, and arithmetic teaching skills.	0	2	23	154	108	O	Often
⁶ I manage my classroom effectively to create an environment conducive to learning the 3Rs.	0	0	30	136	121	O	Often
⁷ I collaborate with colleagues to develop and share effective teaching strategies for the 3Rs.	0	0	37	157	93	O	Often
⁸ I provide timely and constructive feedback to students to support their learning in reading, writing, and arithmetic	0	0	25	157	105	O	Often
⁹ I regularly reflect on my teaching practices to improve my strategies for addressing learning gaps in the 3Rs.	0	0	15	164	108	O	Often

Note. N=Never, R=Rarely, S=Sometimes, O=Often, A=Always

Table 3 reveals that teachers consistently apply various competencies to address learning gaps in reading, writing, and arithmetic (3Rs), with most items receiving a mode of "Often." This indicates a solid foundational knowledge among teachers, though there is room for increased frequency or confidence in their practices.

Teachers generally rated their competencies positively, with the majority of responses falling under "Often" and "Always." For instance, 160 teachers indicated "Often" for possessing comprehensive knowledge of the 3Rs, while 103 selected "Always," resulting in a mode of "Often." Similarly, a strong understanding of curriculum

requirements also had a mode of "Often," with 163 teachers responding "Often" and 105 responding "Always." This reflects solid foundational knowledge among teachers.

In terms of instructional application, 147 teachers responded "Often," and 124 responded "Always," showing consistent effort in applying teaching skills. Confidence in assessing student progress and seeking professional development opportunities both followed the same trend, with "Often" being the mode. The latter reflects a proactive approach to improving instructional skills but also indicates potential barriers to accessing professional growth opportunities.

Collaboration with colleagues and providing constructive feedback were similarly rated. Teachers frequently collaborate, as evidenced by 157 responses of "Often" and 93 of "Always." However, the relatively lower "Always" responses highlight a need for fostering stronger collaborative practices. Classroom management received comparable ratings, with "Often" as the mode, suggesting consistent efforts to create conducive learning environments. Lastly, reflecting on teaching practices received strong ratings, with 164 teachers responding "Often" and 108 responding "Always."

The findings imply that while teachers demonstrate consistent competencies in addressing learning gaps, enhancing the quality and frequency of their practices could lead to better student outcomes. Teachers may benefit from targeted professional development to strengthen areas such as collaborative strategies and instructional innovation. Additionally, fostering a culture of peer support and reflective practice can enhance teacher confidence and competency over time.

Recent studies emphasize the importance of Pedagogical Content Knowledge (PCK) in effective teaching. For instance, a study by Lyu (2021) investigates teachers' views on PCK, highlighting its critical role in teaching effectiveness.

Additionally, research by Doukakis et al. (2021) measures the Technological Pedagogical Content Knowledge (TPACK) of in-service computer science teachers, underscoring the need for integrating technology with pedagogy and content knowledge.

These findings suggest that while teachers demonstrate consistent competencies, there is a need for ongoing professional development to enhance areas such as collaborative strategies and instructional innovation. Strengthening these competencies will not only address learning gaps but also contribute to a more effective and equitable educational system.

B. Students as Respondents

Table 4 Ratings of Students on Mechanisms and Strategies for Addressing Learning Gaps and Losses in Technology Access

Indicators Technology Access	Responses (<i>n</i> =381)					Mode	Qualitative Description
	SD	D	N	A	SA		
¹ Students have regular access to computers or tablets for learning activities.	94	27	59	105	96	A	Agree
² Internet access is reliable and sufficient for educational purposes.	114	61	72	84	50	SD	Strongly Disagree
³ Digital resources and tools are integrated into the learning process.	112	62	85	72	50	SD	Strongly Disagree
⁴ Students are provided with training and support on how to use educational technology.	102	73	77	67	42	SD	Strongly Disagree

⁵ Technology is used to enhance understanding and engagement in the 3Rs.	80	59	84	68	47	N	Neutral
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Note. SD= Strongly Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree

The data in Table 4 reveals students’ perspectives on the availability and utilization of infrastructure in supporting learning activities, particularly in the use of technology to address gaps in the 3Rs (Reading, Writing, Arithmetic). The findings suggest notable challenges in access to and effective use of technology, with significant implications for improving infrastructure and support systems in schools.

It was shown in the table that 53% of students agreed (105) or strongly agreed (96) that they have regular access to computers or tablets. However, 25% strongly disagreed (94) and 7% disagreed (27), indicating gaps in access. While many students perceive positively, a substantial portion lacks regular availability of technological devices, potentially limiting their ability to engage with modern learning tools.

On the other hand, only 35% of students agreed or strongly agreed that internet access is reliable, while 46% strongly disagreed (114), and 16% disagreed (61). This yielded a mode of "Strongly Disagree." This implies that a lack of reliable internet access is a significant barrier, limiting the use of online resources and tools essential for modern education. Similarly, 45% of students strongly disagreed (112) or disagreed (62) with the integration of digital resources, while only 32% agreed (72) or strongly agreed (50). The mode was "Strongly Disagree." This indicates that limited integration of digital tools into the learning process suggests that schools may lack either the resources or the training to effectively implement these technologies.

However, most students (46%) strongly disagreed (102) or disagreed (73) that they receive training and support for using educational technology. Only 28% agreed (67) or strongly agreed (42), with a mode of "Strongly Disagree." This suggests that students do not receive adequate support to use educational tools effectively, which limits their ability to benefit from technology in learning. Moreover, as for the use of technology to enhance learning, responses were mixed, with 36% neutral (84), 30% agreeing (68) or strongly agreeing (47), and 37% strongly disagreeing (80) or disagreeing (59). The mode was "Neutral", indicating that while some students perceive technology as enhancing their learning, the high neutral response indicates uncertainty or inconsistent use of technology in classrooms.

The findings indicate that technological infrastructure and support remain critical challenges in addressing learning gaps. Research by UNESCO (2022) underscores the transformative potential of technology in education but emphasizes that equitable access and teacher training are essential for its effective use. Similarly, a study by the OECD (2021) highlights that students in schools with better technological resources perform significantly better in foundational skills, provided they receive appropriate guidance and training.

Table 5 Ratings of Students on Mechanisms and Strategies for Addressing Learning Gaps and Losses in Pedagogical Approaches

Indicators Pedagogical Approaches	Responses (n=381)					Mode	Qualitative Description
	N	R	S	O	A		
¹ Lessons are engaging and promote active learning.	5	6	58	122	190	A	Agree
² Instructional methods cater to diverse learning styles.	9	10	67	154	141	O	Often
³ Learning activities are well-organized and clearly presented	4	8	74	140	155	A	Agree
⁴ Teachers use real-life examples to explain concepts.	6	13	62	134	166	A	Agree
⁵ Feedback on student work is timely and constructive.	18	17	65	148	133	O	Often

Note. N=Never, R=Rarely, S=Sometimes, O=Often, A=Always

Table 5 reflects students' perceptions of their teachers' pedagogical approaches and their effectiveness in addressing learning gaps in the 3Rs (Reading, Writing, Arithmetic). Overall, the data highlights positive engagement but also reveals areas needing improvement to ensure consistent and effective instructional practices.

Students rated lessons as engaging and promoting active learning positively, with 190 selecting "Always" and 122 selecting "Often," resulting in a mode of "Agree." This suggests that most teachers effectively create engaging learning environments. Similarly, 155 students selected "Always" and 140 selected "Often" for the organization and clarity of learning activities, leading to another mode of "Agree." These responses indicate that structured and presented activities are a common strength in pedagogical practices. The use of real-life examples to explain concepts was also highly rated, with 166 students selecting "Always," showing that teachers effectively relate lessons to practical applications.

However, instructional methods catering to diverse learning styles had a mode of "Often," with 154 responses, indicating that while these practices are common, they are not universally applied. This may suggest a need for more comprehensive strategies to address varied learning preferences. Feedback on student work, while positively rated, also had a mode of "Often," with 148 responses, highlighting potential variability in the timeliness or consistency of constructive feedback.

These findings underscore the importance of enhancing pedagogical approaches to ensure consistent application across classrooms. The use of active learning and real-life examples reflects a strong foundation in engaging students, but improvements in catering to diverse learning needs and providing timely feedback are necessary. Research by Hattie (2018) confirms the impact of feedback and differentiated instruction on improving student outcomes, while a study by Mishra and Koehler (2020) emphasizes the value of adapting teaching methods to accommodate varied learning styles.

Table 6 Ratings of Students on Mechanisms and Strategies for Addressing Learning Gaps and Losses in Teacher Support

Indicators Teacher Support	Responses (n=381)					Mode	Qualitative Description
	SD	D	N	A	SA		
¹ The teacher is approachable and available for extra help.	8	7	45	149	172	SA	Strongly Agree
² The teacher provides clear instructions and explanations.	4	19	68	168	122	A	Agree
³ The teacher shows understanding and support for individual learning needs.	7	12	66	183	113	A	Agree
⁴ The teacher encourages and motivates students to do their best.	13	17	58	158	135	A	Agree
⁵ The teacher regularly checks student progress and offers assistance as needed.	20	17	60	157	127	A	Agree

Note. SD=Disagree, D=Disagree, N=Neutral, A=Agree, SA=Strongly Agree

Table 6 presents students' perceptions of teachers' support mechanisms in addressing learning gaps and fostering academic growth in the 3Rs (Reading, Writing, Arithmetic). The responses indicate a generally positive view of teacher support, with some areas reflecting opportunities for improvement.

The highest-rated indicator was teacher approachability and availability for extra help, with a mode of "Strongly Agree," supported by 172 students responding "Strongly Agree" and 149 responding "Agree." This suggests that

most teachers are perceived as accessible and willing to provide additional assistance. Similarly, providing clear instructions and explanations received a mode of "Agree," with 168 students selecting "Agree" and 122 selecting "Strongly Agree," highlighting that teachers effectively communicate content but may need to focus on addressing varied levels of student comprehension.

Understanding and supporting individual learning needs also had a mode of "Agree," with 183 students responding "Agree" and 113 responding "Strongly Agree." This demonstrates a commitment to individualized support but indicates that some students may feel their needs are not fully addressed, as reflected in 66 neutral responses. Teachers' encouragement and motivation had a similar trend, with 158 "Agree" responses and a mode of "Agree," showing consistent efforts in promoting student confidence.

Lastly, regular checks on student progress and offering assistance received a mode of "Agree," with 157 responses. While this reflects a positive effort, the 60 neutral and 37 disagree responses suggest inconsistencies in practice. Overall, the findings emphasize that while teacher support mechanisms are strong, there is room for improvement in consistency and tailored approaches.

These results align with research highlighting the impact of teacher support on student outcomes. According to a study by Hamre and Pianta (2019), students with supportive teachers exhibit greater academic engagement and achievement. Additionally, Darling-Hammond et al. (2020) emphasize that clear communication and personalized feedback are critical to addressing learning gaps effectively.

CONCLUSION

The study reveals a complex but informative picture of the mechanisms addressing learning gaps in the 3Rs. While teachers reported generally adequate instructional resources, conducive learning environments, and supportive administrative systems, students experienced significant challenges in accessing technology and digital tools. This discrepancy underscores an urgent need to align institutional perceptions with actual learner experiences. Pedagogical approaches were largely positive, with active learning, real-life applications, and structured lessons emerging as instructional strengths. However, differentiated instruction, technology-supported learning, and consistency in feedback require further strengthening. Teacher competencies were rated highly, particularly in curriculum understanding, instructional skills, and reflective practice. Nevertheless, ongoing professional development, especially in technology integration and evidence-based remedial strategies, is critical. Teacher support emerged as a strong factor, with students perceiving their teachers as approachable, encouraging, and responsive. Yet variations in monitoring progress and individualized support suggest that more systematic frameworks are needed.

Collectively, the findings highlight the interdependence of infrastructure, pedagogy, and teacher capability in overcoming learning gaps. Integrating these elements into a coherent recovery strategy is essential for improving foundational literacy and numeracy outcomes.

RECOMMENDATIONS

Based on the results, several recommendations are proposed for schools, policymakers, and educational stakeholders to strengthen learning recovery efforts. First, infrastructure and technology must be enhanced by ensuring equitable access to digital devices, improving school internet connectivity, establishing dedicated learning spaces, and allocating sustainable funding for technological maintenance and upgrades. Teacher competencies should be reinforced through targeted professional development in digital pedagogy, differentiated instruction, and formative assessment, supported by coaching, peer monitoring, and regular Learning Action Cells focused on foundational skills and remedial instruction. In terms of pedagogy, schools are encouraged to strengthen formative assessment systems, institutionalize constructive feedback mechanisms, and adopt structured literacy, guided writing, and problem-based mathematics interventions to assist struggling learners. Student support systems should be expanded through remedial, enrichment, and catch-up programs, increased tutoring and SPED services, and training in digital tool use to enhance engagement and efficiency. Finally, administrative and policy improvements are needed by aligning resource deployment with student needs,

conducting regular monitoring and evaluation of instructional practices and outcomes, and institutionalizing school-wide learning recovery frameworks that integrate technology, pedagogy, and teacher development.

REFERENCES

1. Darling-Hammond, L., Flook, L., Cook-Harvey, C., Barron, B., & Osher, D. (2020). Implications for educational practice of the science of learning and development. *Applied Developmental Science*, 24(2), 97–140. <https://doi.org/10.1080/10888691.2018.1537791>
2. Hamre, B. K., & Pianta, R. C. (2019). Learning opportunities in preschool and early elementary classrooms. *The Future of Children*, 29(2), 49–69.
3. Hattie, J. (2018). *Visible learning: Feedback*. Routledge.
4. Mishra, P., & Koehler, M. J. (2020). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, 108(6), 1017–1054.
5. Organisation for Economic Co-operation and Development. (2021). *Education at a glance 2021: OECD indicators*. OECD Publishing. <https://doi.org/10.1787/b35a14e5-en>
6. United Nations Educational, Scientific, and Cultural Organization. (2022). *Reimagining our futures together: A new social contract for education*. UNESCO.
7. World Bank. (2019). *Ending learning poverty: What will it take?* World Bank Publications.