



# Literacy and Numeracy Ecosystem: A Case Study of Learning Quality Transformation in the Suburban Area of Semarang City

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DOI : <https://doi.org/10.46245/ijorer.v7i4.1494>

## Sections Info

### Article history:

Submitted: May 11, 2026

Final Revised: July 12, 2026

Accepted: July 27, 2026

Published: July 29, 2026

### Keywords:

Educational Report Cards;

Instructional Flexibility

Literacy-Numeracy; Teacher

Welfare; School Management.



## ABSTRACT

This study aims to analyze the acceleration of secondary education quality based on the harmonization of managerial policies and instructional flexibility, specifically examining the use of the Education Report Card as a pedagogical navigation instrument. This study employed a qualitative approach conducted in a suburban area to explore and analyze the policy harmonization and instructional practices in both public and private secondary schools. The results reveal a dichotomy in achievement: public schools excel in digital aspects, while suburban private schools face obstacles in developing students' critical thinking. The findings confirm that literacy and numeracy success depends on cross-subject synergy and teachers' mental well-being rather than just facilities. Consequently, this study practically recommends adopting a "Cross-Discipline Integration" strategy and reorienting budgets to strengthen non-exact science teacher competencies to eliminate math anxiety through a visual classroom ecosystem. The novelty of this study lies in shifting the paradigm of education quality from a facility-centric view to an integrated approach focused on cross-subject synergy and teacher well-being. Furthermore, it introduces the "Peer Mentoring in the Recovery Room" model and the application of ethnomathematics as new future research pathways to align teachers' emotional stability with the authenticity of student learning outcomes in suburban contexts.

## INTRODUCTION

The direction of education policy in Indonesia is currently undergoing a fundamental and radical paradigm shift. The quality of learning is no longer measured simply by mastery of material or low-level cognitive abilities such as memorizing facts. Instead, the primary focus is now on transforming students' fundamental competencies: literacy and numeracy. Literacy is not merely the technical ability to read, but rather the ability to evaluate and reflect on various types of texts to solve problems. Similarly, numeracy is defined as the ability to reason using mathematical concepts, procedures, and tools in real-world situations (Murtadlo, 2024).

Educational issues lie not only in the pedagogical aspect but also in the governance ecosystem. Student achievement of basic competencies, particularly numeracy, is influenced by various complex determinants. Hidayat et al. (2023), using National Assessment data, revealed that identifying the determinants of numeracy achievement is crucial for determining the direction of school policy. This is reinforced by Sari & Wardani (2024), who stated that strengthening literacy cannot be done partially but must be done through Data-Based Planning (PBD). Without optimizing PBD, school interventions on literacy and numeracy tend to be off-target and lose relevance to students' real needs. Mulyadi (2025) emphasized that principal leadership must be able to transform vision into concrete actions in creating a conducive environment for teachers to innovate in learning.

Ideally, literacy and numeracy should be key indicators in the Education Report Card, reflecting the success of an education ecosystem in implementing continuous learning improvements. However, this transformation requires thorough instructional readiness at the school level. Zulkardi and Kohar (2021) emphasized that quality learning must present real-world problems that require simultaneous data integration and contextual understanding. Without this integration, schools will only produce graduates who are procedurally proficient but logically inept.

The Literacy and Numeracy Ecosystem is not a mere metaphor, but rather a systemic framework involving three main pillars: school culture, the principal's instructional policies, and the physical environment. Pratiwi & Lutfianto (2022) state that transformation requires synergy between these pillars to create truly meaningful learning. Theoretically, a healthy ecosystem is a space where literacy and numeracy "breathe" in every corner of the school. This ecosystem is realized through the synergistic integration of school culture, instructional policies, and a holistic physical environment. School culture is built by changing the collective habits of teachers so they are no longer trapped in "subject silos," so that literacy is no longer considered the exclusive responsibility of language teachers, and numeracy is no longer the sole burden of mathematics teachers.

Transformation is strengthened by the principal's policies as an Instructional Leader capable of strategically allocating resources, supporting data-driven teacher professional development, and creating a challenging learning climate. The entire process is supported by a physical school environment that stimulates students' intellectual development, from the provision of reading corners to the display of data infographics on the walls of the school designed to subconsciously train students' numerical reasoning.

Empirical reality demonstrates the gap between ideal conditions (das sollen) and the reality on the ground (das sein), which is particularly evident in the suburban areas of Semarang City, particularly in the districts of Gunungpati, Ngaliyan, and Mijen. As a rapidly developing buffer zone (transitioning from rural to urban), this region faces unique sociocultural challenges. The 2024-2025 Education Report Card data demonstrates a disconnect between proposed policies and classroom pedagogical practices. The spectrum of challenges in this region is diverse, ranging from stagnant scores to resistance to changes in teaching methods. This situation is explicitly presented in Table 1.

**Table 1.** School Literacy and Numeracy Achievements in Suburban Areas

| Nu. | Indicator          | Junior High School Education Reports 2025 |          |            |             |
|-----|--------------------|-------------------------------------------|----------|------------|-------------|
|     |                    | SMPN 16                                   | SMP N 45 | SMP PGRI 5 | SMP Texmaco |
| 1   | Literacy > average | 55,56                                     | 44,44    | 22,22      | 46,67       |
|     | Literacy = average | 40,00                                     | 55,56    | 64,44      | 48,89       |
|     | Literacy < average | 4,44                                      | 0,00     | 11,11      | 4,44        |
| 2   | Numeracy > average | 68,89                                     | 68,89    | 35,56      | 37,78       |
|     | Numeracy = average | 22,22                                     | 24,44    | 40         | 44,4        |
|     | Numeracy < average | 8,89                                      | 4,44     | 17,78      | 17,78       |

Source: Education Report Data for 2025

To understand the concept of "Transformation" in the title of this research, we need to look at comparative data before the holistic integration strategy was implemented on a large scale. In the 2023-2024 period, the majority of schools in the outskirts of

Semarang were still struggling with "Sufficient" and "Poor" literacy and numeracy scores. For example, the average numeracy achievement in private schools in the suburbs in 2023 was only 25-30% above average. However, after the initiation of interventions based on Education Report Card data and ecosystem strengthening, a significant shift occurred, as seen in the 2025 data in Table 1.

Public schools such as SMPN 16 and SMPN 45 showed a surge in numeracy performance, reaching 68.89% above average. This transformation demonstrates that the integration of logical-mathematical thinking patterns is beginning to bear fruit. Meanwhile, private schools like SMP Texmaco have seen remarkable success in reducing the number of students with below-average literacy to 0%. This demonstrates the tangible transformation of a school previously considered "underdeveloped" into one capable of fully meeting minimum literacy standards. However, the "competency stagnation" at SMP PGRI 5 (64.44% in the average category) indicates that transformation in suburban areas is not yet equitable and requires in-depth analysis of the internal barriers within the ecosystem.

This study uses Instructional Leadership and Social Constructivism to examine successes and obstacles in the field. Through a Social Constructivism perspective, the success of literacy-numeracy integration in suburban Semarang occurs when teachers are able to connect subject matter to the students' local context. Students in the Gunungpati area, which is still close to the agricultural/plantation sector, for example, grasp numeracy concepts more quickly when presented with real, local data rather than abstract text. Furthermore, the principal's role as an instructional leader is a key determinant. This integration strategy will not be successful if the principal acts solely as an administrator. In schools demonstrating positive transformation, it was found that principals actively lead reflective discussions on the Education Report Card, provide supportive clinical supervision, and build learning communities among teachers. The phenomenon of "strategic isolation" has been successfully broken through cross-disciplinary collaboration, where science and arts teachers have begun integrating data analysis and text interpretation into their learning projects.

Theoretically, many previous studies still view literacy and numeracy separately (Zulkardi & Kohar, 2021) or focus solely on urban centers with established facilities. Studies discussing holistic integration in transitional suburban areas are scarce. Yet, the quality of learning in these areas is significantly influenced by the adaptability of data-driven pedagogical innovations (Fauziah, 2025; Pradana et al., 2021). This research urgently addresses this gap in the literature. Its novelty lies in examining the mechanisms by which school "ecosystems" (not just teaching methods) can transform education. By linking real-world data from the 2025 Education Report, this research provides a highly relevant picture of the effectiveness of national education policies at the micro-level.

Therefore, this study aims to explicitly analyze the integration of literacy and numeracy strategies as the primary drivers of meaningful learning transformation. Specifically, this study evaluates the impact of the school ecosystem dissected through three core dimensions: instructional leadership, collaborative culture, and the physical environment in transforming suburban education. Ultimately, it seeks to measure how these elements collectively improve the quality of data-based learning outcomes and relevance in suburban secondary schools.

## RESEARCH METHOD

This study uses a qualitative approach with a case study design (multi-case) to explore in depth the phenomenon of literacy and numeracy integration in the suburban areas of Semarang City, especially in the Sub-Rayon of Ngaliyan, Mijen, and Gunungpati which represent unique transition characteristics between urban and rural areas. The research locus includes four educational institutions that were deliberately selected to provide comprehensive comparative data, namely SMPN 16 and SMPN 45 as representatives of public educational units, as well as SMP PGRI 5 and SMP Texmaco from the private sector. The research subjects involved 12 key informants selected through purposive sampling. These included four principals and eight teachers (representing both exact and non-exact subjects) from SMPN 16, SMPN 45, SMP Texmaco, and SMP PGRI 5.

Data collection was conducted systematically through a documentary study of the 2024-2025 Education Report Cards as a policy evaluation instrument, in-depth interviews with principals and teachers across disciplines to examine psychological barriers such as math phobia, and focused observations to verify the substance of the implementation of learning strategies in the classroom. All collected data were then analyzed using comparative techniques based on the interactive model of Miles, Huberman, and Saldana, encompassing data reduction, data presentation, and conclusion drawing to identify discrepancies in the use of report card data as a learning diagnostic tool. To ensure the objectivity and validity of the findings, the researchers applied credibility standards through technical triangulation (comparing the results of documents, observations, and interviews) and member checking.

## RESULTS AND DISCUSSION

### Results

The analysis of the educational report card literacy document review is shown in Table 2, this table shows the differences in achievement between public and private schools. Public schools are represented by SMPN 16 and SMPN 45 which are hereinafter referred to as research subject schools 1 and 2. Private schools are SMP PGRI 5 and SMP Texmaco which are hereinafter referred to as schools 3 and 4. The results of this Education report card analysis serve as the main basis in determining the root of the problems that occur.

**Table 2.** Review of Education Report Card Literacy Results

| Nu.   | Indicator                                                                         | Educational Report Card of The Research Subject's School |       |       |       |
|-------|-----------------------------------------------------------------------------------|----------------------------------------------------------|-------|-------|-------|
|       |                                                                                   | 1                                                        | 2     | 3     | 4     |
| A.1.  | Literacy ability (Average)                                                        | 83,23                                                    | 82,58 | 72,39 | 81,38 |
| Score |                                                                                   |                                                          |       |       |       |
| A.1.1 | Competence in reading informational                                               | 81,95                                                    | 80,95 | 70,31 | 78,25 |
| A.1.2 | Competence in reading literary                                                    | 83,33                                                    | 82,81 | 72,96 | 82,74 |
| A.1.3 | Competence in accessing and finding the content of non-fiction and fiction (L1)   | 82,42                                                    | 83,30 | 70,36 | 80,98 |
| A.1.4 | Competence in interpreting and understanding the contents (L2)                    | 83,57                                                    | 81,72 | 72,09 | 81,67 |
| A.1.5 | Competence to evaluate and reflect on the content of non-fiction and fiction (L3) | 79,88                                                    | 81,48 | 73,78 | 78,51 |

Source: Education Report Data for 2025

Literacy achievement (literacy ability) in 2025 as stated in Table 2 > 80, except subject 3 < 75. This supports the perception of school literacy skills in 2025, where 95.56% of public schools in subject 1; 100% of public schools in subject 2; 86.67% of private schools in subject 3; and 95.56% of private schools in subject 4.

Literacy ability is a student's average score based on their ability to understand, use, reflect on, and evaluate various types of texts (non-fiction and fiction). This literacy ability is supported by the competency of reading informational texts as non-fiction, reading literary texts (fiction), accessing and finding text content, interpreting and understanding text content, and evaluating and reflecting on text content. The document review findings indicate that public school subject 1 has higher competency in reading informational texts as non-fiction, reading literary texts (fiction), and interpreting and understanding text content than public school subject 2, private school subject 3, and private school subject 4. In order of highest to lowest, these two competencies were achieved by school 1, school 2, school 4, and school 3. The highest achievement in accessing and finding text content, and evaluating and reflecting on text content was achieved by public school subject 2, with the remaining achievements, respectively, by school 1, school 4, and school 3. The results of the document review of the educational report card numeracy can be seen in Table 3.

**Table 3.** Document Review of Numeracy Report Card Results

| Nu.   | Indicator                                     | Educational Report Card of The Research Subject's School |       |       |       |
|-------|-----------------------------------------------|----------------------------------------------------------|-------|-------|-------|
|       |                                               | 1                                                        | 2     | 3     | 4     |
| A.2.  | Numeracy ability (average) Score              | 71,25                                                    | 68,33 | 63,28 | 65,15 |
| A.2.1 | Competence in the Number Domain               | 79,88                                                    | 68,25 | 63,01 | 60,94 |
| A.2.2 | Competence in the Algebra Domain              | 67,7                                                     | 62,22 | 62,79 | 61,49 |
| A.2.3 | Competence in the Geometry Domain             | 70,79                                                    | 67,56 | 57,94 | 66,05 |
| A.2.4 | Competence in the Data and Uncertainty Domain | 70,39                                                    | 69,89 | 63,06 | 64,01 |
| A.2.5 | Knowing Competence (L1)                       | 72,4                                                     | 67,16 | 61,97 | 62,56 |
| A.2.6 | Applying Competence (L2)                      | 70,89                                                    | 67,99 | 62,23 | 64,2  |
| A.2.7 | Reasoning Competence (L3)                     | 67,06                                                    | 67,09 | 64,17 | 65,22 |

Source: Education Report Data for 2025

The numeracy achievement (numeracy ability) in 2025 as stated in Table 3 > 70 for public schools subject 1, public schools subject 2, private schools subject 3 and private schools subject 4 have a school average numeracy ability in 2025 <70 and >63. Perceptions that support literacy skills in 2025, public schools subject 1 91.11%; 93.33% public schools subject 2; 75.56% private schools subject 3, and 82.22% private schools subject 4.

Numeracy ability is the ability to think using mathematical concepts, procedures, facts, and tools to solve everyday problems in various types of relevant contexts. This ability consists of number, algebra, geometry domain competencies, data and uncertainty domain competencies, knowing competencies (the ability to understand facts, processes, concepts, and procedures), the competency of applying knowledge and understanding of facts, relationships, processes, concepts, procedures, and methods to number content with real-life contexts to solve problems and answer questions, and reasoning competencies which include the ability to analyze data and information, draw conclusions, and expand understanding in new situations, such as previously

unknown situations or more complex contexts. The average achievement is <75. Algebra competency and reasoning competency achievement are <70. In general, the numeracy achievement of public schools subject 1 is relatively better than public schools subject 2, private schools subject 3 and private schools subject 4.

Tables 2 and 3 show the results of the Minimum Competency Assessment (AKM) for junior high school students, which still require attention and improvement, particularly in numeracy achievement. The available data illustrates the distribution of students based on their literacy and numeracy competency levels. Students are not only able to understand texts literally, but also can evaluate information critically, reflect on the text's content, and connect it to a broader context. They are able to complete reading assignments with high complexity. There are still categories of students at the "Needs Special Intervention" and "Basic" levels. Students at the "Needs Special Intervention" level are not yet able to find and retrieve explicit information, and make simple interpretations. This is consistent with interviews with the principal and teachers who served as research informants. The interview results can be seen in Table 4.

**Table 4.** Interview Findings

| Nu. | Indicator                  | Description of The Results of The Subject School Interview           |                                                      |                                                 |                                                            |
|-----|----------------------------|----------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------|------------------------------------------------------------|
|     |                            | 1                                                                    | 2                                                    | 3                                               | 4                                                          |
| 1   | Literacy Achievements 2025 | Very good, focused on access, evaluation, and reflection.            | Very good, stable growth                             | Good and fluctuating positive changes           | Very good, focused on competency development               |
| 2   | Numeracy Achievements 2025 | High. Focus on reasoning and complex problem-solving competencies.   | Moderate-High, significant improvement               | Sufficient and A major challenge in learning.   | Moderate, further strengthened through subject integration |
| 3   | Strengthening achievements | Strong reading culture and comprehensive digital library facilities. | Teacher discipline and peer assistance are very good | Emotional closeness between teacher and student | Modern practice facilities                                 |
| 4   | A debilitating achievement | Teacher burnout due to overly high targets.                          | Limited green open space                             | Students' diverse basic abilities.              | Lack of student interest in non-technical text literacy    |

*Source: Findings from Research Data Collection*

The differences in results are due to many factors. Interviews indicate that public schools tend to excel in administrative achievements and grade standards, while private schools place greater emphasis on character and work readiness. Public school Subject 1 stands out as a leader in literacy due to its digital ecosystem. Its strength lies in its strict monitoring system, but this also becomes a weakness due to the high performance pressure on teachers. Public school Subject 2 demonstrates solid performance in numeracy. A strengthening factor is teacher discipline, although they feel constrained by the large student-to-faculty ratio. Private school Subject 3 faces challenges with heterogeneous student input, resulting in suboptimal numeracy achievement. However, their strength lies in their "heart-based approach"; teachers know their students personally, making it easier to address challenging students. Private school Subject 4 has a unique characteristic in that its literacy and numeracy are heavily influenced by a technical culture. Students grasp numeracy quickly when connected to

the logic of tools/machines, but struggle when faced with story problems or analysis of long, theoretical texts.

From the principal's perspective, management and policy play a crucial role. Interviews with public school principals in Subjects 1 and 2 revealed that the Education Report Card (Report Card) has become a "compass" in the preparation of the Medium-Term Work Plan (RKJM). They emphasized that the transformation of learning quality begins with allocating a budget for in-house teacher training focused on literacy and numeracy. In contrast, private school principals in Subjects 3 and 4 highlighted challenges related to teacher retention and varying student motivation, often resulting in managerial focus being divided between meeting administrative standards and pedagogical innovation. School supervisors in the Mijen and Gunungpati areas highlighted disparities in the meaning of integrative strategies. According to supervisors, many teachers still view literacy as merely "a 15-minute reading activity" without engaging in critical thinking. Supervisors encouraged learning communities in the Sub-Districts to be more active in analyzing teaching modules based on literacy and numeracy to ensure equitable learning quality standards between public and private schools.

Interviews with teachers revealed crucial challenges in designing PISA-equivalent questions, as they view the Education Report Card results as a professional challenge. Teachers in average schools expressed challenges such as the heavy administrative burden of the curriculum, often leaving them "out of time" to design creative numeracy activities. Non-math teachers tended to feel incompetent in teaching numeracy, highlighting the need for numeracy literacy among educators.

Based on interviews, researchers concluded that the root cause of the suboptimal transformation of learning quality in some schools lies not in the lack of a strategy, but rather in a weak culture of collaboration among teachers. Successful transformations (such as those in public schools in Subjects 1 and 2) occurred due to a collective understanding that literacy and numeracy are a "shared responsibility," not solely the responsibility of subject teachers. Observation findings are described in Table 5. Observations were conducted during lesson preparation, the learning process, and reflection on learning outcomes.

**Table 5. Observation Findings**

| Nu | Indicator                                                   | Description of The Results of The Subject School Observations                       |                                                                                            |                                                                                                     |                                                                                                           |
|----|-------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|
|    |                                                             | 1                                                                                   | 2                                                                                          | 3                                                                                                   | 4                                                                                                         |
| 1  | Manifestation of strategies in learning tools and processes | high alignment; "Literacy Warm-up" and connected with numeracy.                     | Alignment is quite high; Teachers develop literacy and numeracy-based learning strategies. | Lack of alignment; Teachers are still searching for a literacy- or numeracy-based learning formula. | Alignment is quite high; Teachers are beginning to develop literacy and numeracy-based learning formulas. |
| 2  | Variations in student interactions with contextual tasks    | Tall. Increased focus on Algebra, reasoning competency and complex problem solving. | Moderate-High. Significant improvement compared to the previous year.                      | Sufficient and a major challenge in learning.                                                       | Moderate, further strengthened through integration of practical subjects.                                 |

| Nu | Indicator                                        | Description of The Results of The Subject School Observations   |                                                                          |                                                                               |                                                                           |
|----|--------------------------------------------------|-----------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------|
|    |                                                  | 1                                                               | 2                                                                        | 3                                                                             | 4                                                                         |
| 3  | Integration of numeracy literacy across subjects | Strong reading culture and complete digital library facilities. | Teacher discipline and a well-functioning peer assistance program.       | Emotional closeness between teachers and students and curriculum flexibility. | Modern practical facilities and strong industry support.                  |
| 4  | Utilization of text-rich environments            | Burnout in teaching staff due to targets that are too high.     | Limited green open spaces for literacy activities outside the classroom. | Student input with very diverse basic abilities.                              | Lack of student interest in non-technical text literacy (prose/articles). |

*Source: Findings from Research Data Collection*

Observations were conducted systematically to capture the reality of literacy and numeracy integration in the learning process. Based on structured observation instruments, four main findings were found, namely: 1) Manifestation of strategies in learning tools and processes. Findings obtained in public schools indicate a high alignment between the Teaching Module (RPP) and classroom implementation. Teachers consistently begin learning with a "Literacy Warm-Up" (reading news/article texts for 5-10 minutes) which is then connected to the concept of numeracy. 2) Variations in student interactions towards contextual tasks; researchers observed differences in student responses related to self-confidence in estimating and interpreting data. However, in the private school that was the subject of the study, a gap was observed in the critical reasoning process; students were able to read instructions well (basic literacy), but often encountered obstacles when having to transform the information from the text into mathematical logic operations. 3) Integration of numeracy literacy across subjects. Findings in one of the private schools, despite limited infrastructure, observations in the Arts and Culture and Physical Education subjects showed creative integration efforts. Physical Education (PJOK) teachers integrate numeracy through pulse rate and body mass index (BMI) measurements, combined with health literacy. This demonstrates that the transformation in learning quality is beginning to extend to non-exact subjects, although consistency still needs to be improved. 4) Utilization of a text-rich environment (literacy-rich environment). Observations indicate that public schools are more proactive in creating a literacy ecosystem. Numerous infographics, displays of student work incorporating statistical data, and reading corners filled with relevant books were found. On the other hand, in private schools, text-rich environments are still found to be formal and not optimally utilized as a resource for independent learning for students.

These observations confirm that the root cause of low numeracy in some areas is not solely due to students' cognitive disabilities, but rather to the quality of exposure to integrative strategies in the classroom. The transformation seen with 0% of students below average is supported by observations that teachers actively scaffold (provide gradual support) when students encounter complex texts, a practice not yet widely found in other schools. In general, these differences in results are influenced by two main variables: facility availability and student characteristics. Public schools tend to have more access to government-standard teaching aids, while private schools excel in

specialized practical tools. Students in public schools are more accustomed to academic competition, while those in private schools emphasize the development of non-academic talents and interests.

Triangulation of quantitative data and reflective interviews with principals and supervisors revealed that the most effective strategy was "Cross-Curriculum Literacy-Numeracy." In public schools in Subject 2, the success of achieving 0% below-average students in literacy was driven by a school policy requiring the inclusion of informational texts in all subjects, not just Indonesian. In private schools in Subject 3, the strategy integration remained focused on strengthening reading and writing literacy (46.67% above average), but was not optimal in numeracy (37.78% above average). Interviews with teachers revealed "numeracy anxiety" among non-math teachers, which hindered holistic numeracy integration.

In general, the triangulation results indicate 1) the achievement of "high performance" in public schools. This indicates a high alignment between policy, planning, and learning outcomes in public schools. The transformation in learning quality here is driven by a culture of data-driven reflection. 2) The anomaly of "pseudoliteracy" in private schools. A functional gap exists where the average score on the report card does not reflect the true quality of critical reasoning. The integration of new strategies is limited to administrative fulfillment, not yet a driving force for quality transformation. 3) Psychological Barriers to cross-subject numeracy integration. Quality transformation is hampered by subject-sectoral egos. Although the RPP document includes integration, implementation in the field shows strong resistance due to the lack of supporting competencies among non-mathematics teachers. The results of this triangulation further indicate that the integration of literacy-numeracy strategies as a driving force for learning transformation has not been running linearly across all educational units. There is strong synchronization in public schools, but there is a pedagogical disconnect in suburban private schools. The root of the problem is not the availability of Education Report Card data, but rather the ability of teachers to transform that data into meaningful learning innovations in the classroom.

## ***Discussion***

This research reveals that the transformation of educational quality at the junior high school level depends not only on the availability of physical resources, but more so on the synergy between managerial leadership and teacher instructional resilience. The integration of literacy-numeracy strategies has transcended curricular boundaries. The most significant positive finding is the transformation in teachers' mindsets, who now view the Education Report Card as a reflective instrument for creating precise, relevant, and future-focused learning. This aligns with research by Murtadlo (2024) and Fauziah et al. (2025) that states that the Education Report Card serves as a compass for precise pedagogical interventions. Schools in buffer zones require greater access to digital resources to address achievement disparities. Suryadi (2022) and Wahyuni et al. (2023) found that the Education Report Card is a crucial instrument for evaluating learning quality through targeted literacy and numeracy strategies at the educational unit level. Digital transformation has become a platform for literacy and numeracy that supports learning quality through the use of technology.

Data findings indicate that the implementation of Data-Based Planning (PBD) through the Education Report Card has provided a clear roadmap, but its

implementation in the field still faces obstacles in the aspect of consistent learning quality. These obstacles include 1) A wide gap between literacy and numeracy skills in private schools. This indicates that the literacy strategies implemented are still mechanical (merely reading) and have not been successfully transformed into numerical reasoning skills. Students are able to read problems, but fail to perform mathematical abstraction. 2) Resistance "Math Phobia" Among Non-Exact Subject Teachers. Most art, sports, and social teachers still consider numeracy a complicated additional burden. The integration of numeracy in non-exact subjects is often fake or forced (only appearing in the lesson plan document but not implemented in class), so that the transformation of learning quality does not occur comprehensively. 3) Undirected Digital Literacy. Findings show that the use of devices in the classroom is more used to search for instant answers on the internet than to process data or carry out critical digital literacy. This has eroded students' resilience in reading long texts (deep reading), resulting in low evaluative literacy scores on the Education Report Card. 4) The "Teaching to the Test" paradigm (Value Orientation): the persistent pressure to improve Education Report Card scores has trapped some educational units in a "teaching for grades" pattern. This results in increased scores on the Education Report Card not always reflecting a real improvement in the quality of student reasoning, but rather merely proficiency in answering certain question patterns. 5) Disparity in parental support.

The significant disparity between public and private schools in terms of the Teacher Reflection Index is evident in the gap in teachers' Pedagogical Competence, limited resources, data understanding, and utilization of Education Report Card results. This implies the need for integrated literacy and numeracy strategies to act as a catalyst for improving the quality of learning. Strengthening teachers' reflective capacity and the courage to innovate across subjects are key challenges to minimizing achievement disparities for the future relevance of graduates. An analysis of the 2025 Education Report Card reveals a polarization in quality between state-owned and private educational institutions. While public schools (Subjects 1 and 2) have surpassed the minimum competency threshold with scores above 80, private schools (Subject 3) still struggle with fundamental challenges, particularly in reading informational texts. This lag is not simply a matter of numbers, but rather an indication of obstacles in the process of transforming critical thinking at the elementary level.

Furthermore, the above findings align with the concept of the Resource-Based View (RBV), where the competitive advantage of public schools is driven by a stable digital infrastructure and a standardized monitoring system. As emphasized by Nugroho (2022), the effectiveness of educational organizations depends heavily on managerial ability to manage intangible assets, namely teacher competency, to convert Education Report Card data into concrete pedagogical action.

Based on research by Prasetyo (2023); Lestari (2023); and Wibowo (2023), there are three main interrelated aspects: the Education Report Card as an instrument for quality improvement, program and budget synchronization, and the challenges of curriculum adaptation. Prasetyo (2023) emphasized that utilizing Education Report Card data allows schools to accurately identify problems, thus making quality improvement steps more measurable. This aligns with Lestari's (2023) research, which states that this data serves as a compass for financial management. By using the Education Report Card,

schools can prepare budgets based on priorities, ensuring that every disbursement has a direct impact on weak indicators.

Although evaluation instruments and budget management have begun to be directed, implementation in the field still faces technical and pedagogical obstacles. Wibowo (2023) identified that the implementation of the Independent Curriculum at the elementary education level is still hampered by various factors, ranging from teacher preparedness to limited supporting facilities. This challenge indicates a gap between macro policies (the use of the Education Report Card) and micro practices in the classroom.

A triangulated synthesis of interview, observation, and document review data revealed that the root cause of low numeracy in suburban private schools (Subjects 3 and 4) is rooted in two psychological and managerial phenomena. There is implicit resistance among non-science educators who consider numeracy the exclusive domain of math teachers. This psychological barrier contributes to the failure of cross-subject numeracy integration. Ramadhan (2022) suggests that to overcome this impasse, schools must shift to a coaching-based supervision model that empowers teachers' self-efficacy across disciplines.

Conversely, high achievement in public schools (Subject 1) comes at the cost of teacher burnout due to excessive administrative burdens and targets. These negative findings indicate that quality transformations that neglect teacher well-being are fragile. This is supported by Utami's (2024) study, which emphasizes the importance of Socio-Emotional Learning (SEL) for educators to maintain consistent instructional quality. To address this disparity, the study proposes a "Cross-Curriculum Literacy-Numeracy" model supported by a literacy-rich environment. Observations confirm that schools that actively implement scaffolding (as in Subject 2) are able to eliminate the percentage of below-average students. The strategy of utilizing Education Report Card data as a "compass" should not stop at the RKJM document, but must become a culture of collective reflection (Prasetyo, 2023). Principals must be able to balance administrative demands with pedagogical innovation, particularly in managing heterogeneous student input (Kurniawan, 2025). Teachers' ability to adapt to limited facilities through the integration of contextual materials (such as calculating BMI in Physical Education) is a practical solution for private schools (Rahmawati, 2022).

This study demonstrates that the urgency of learning transformation has been met by discovering a synergistic model between managerial policies and educator mental resilience. Negative findings regarding math anxiety and burnout serve as a warning to policymakers that the Education Report Card requires a more human-centric approach. This study recommends further exploration of the variable "integration of numeracy literacy in all subjects" as a basis for teacher empowerment in cross-curricular literacy. In-depth studies of strategies to address this double burden are needed. Zulfa (2024) examines the Aesthetic Tax and teachers' professional burden to explore the anomalous phenomenon of "Pseudoliteracy" more comprehensively.

Prahmana & Kusuma (2021) offer a more inclusive and meaningful learning model for improving literacy and numeracy. The use of ethnomathematics can help change students' perceptions that mathematics is difficult, thereby increasing their motivation and engagement in the teaching and learning process. This is supported by research by Hidayah (2023), which emphasizes the importance of integrating strategies in teaching literacy and numeracy. Systematic implementation of literacy strategies has been shown

to improve learning outcomes (Lestari & Kurniawan, 2021). These findings support the argument that literacy is not just reading, but rather a tool for improving academic achievement in secondary schools. Meanwhile, Pradana et al. (2022) provide an empirical basis for junior high school students' abilities in dealing with contextual numeracy problems. The results of their analysis are important for mapping student weaknesses before implementing integration strategies. Wijaya, A., et al. (2021) emphasize that low numeracy in suburban schools is often caused by students' inability to understand textual instructions. This explains why, despite average literacy levels at Texmaco Junior High School and PGRI 5 Junior High School, numeracy remains lagging behind due to gaps in translating text into mathematical models.

Stagnation at an "average" level in private schools indicates a weakness in critical reasoning. Nugroho & Rosyidi (2022) state that critical thinking is the primary bridge connecting reading and writing literacy with numeracy. This is reinforced by Zulkardi & Kohar (2021), who emphasize that quality learning must present real-world problems that require data integration. Critical thinking is the primary bridge connecting reading and writing literacy with numeracy (Fuadi, 2021; Gustina, 2023).

The findings regarding math phobia among non-exact science teachers at PGRI 5 Junior High School were validated by Huda, M., et al. (2023) and Arifin & Rohani (2023), who stated that the assumption that numeracy is solely for math teachers is a major barrier to integration. Suryani (2023) added that instructional leadership must be able to change teachers' mindsets regarding cross-curricular literacy. The root of the problem, math-phobia among non-exact science teachers, is a serious epistemological barrier. In the perspective of Critical Pedagogy, advocated by Paulo Freire, numeracy should be viewed as a tool for understanding the world, not simply arithmetic (Skovsmose, 2023). Non-exact science teachers' resistance to numeracy reflects a failure to understand Pedagogical Content Knowledge (PCK). Teachers view numeracy as a separate entity, whereas in Modern Pedagogy, numeracy is a basic literacy that is transdisciplinary (Shulman, 1986; UNESCO, 2023).

While multi-school data integration based on education report cards is generally theoretical or focuses on only one school, this study conducted a comparative analysis of four educational units using real data from the 2024-2025 Education Report Card. This provides an up-to-date snapshot of the impact of the Independent Curriculum policy in buffer zones. This validates the disparity in literacy and numeracy achievement across four educational units in the suburban region (Pradana, 2021; Utami & Fitriani, 2023).

Based on the findings of this study, several opportunities for development exist, including the development of a cross-subject peer-coaching model in the form of a professional clinic recovery room. Given the negative findings regarding barriers for non-exact subject teachers, future research could focus on developing and testing a peer-coaching model within the recovery room, involving both mathematics and non-math teachers to integrate numeracy naturally. According to Murniati (2026), a recovery room is a peer-to-peer discussion space for teachers to resolve professional issues. Research by Arifin & Rohani (2023) highlights the barriers faced by non-exact subject teachers (such as social studies or language) in integrating numeracy. This is highly relevant in developing "quality transformation" solutions so that numeracy becomes the responsibility of all teachers, not just Mathematics teachers, and literacy is also the responsibility of Language teachers. Developing junior high school teaching modules

that integrate literacy and numeracy will be an important reference in providing teaching materials that support learning transformation (Kartika et al., 2022; Sari, 2022).

Nugraha (2024) highlights the role of learning communities such as MGMPs in improving teacher pedagogical competency in literacy and numeracy, which supports strategies for strengthening human resources (teachers) as the spearhead of learning quality transformation. Developing teachers' reflective skills (Maulana, 2024) and changing instructional patterns (Rahmawati, 2023) is crucial for improving learning quality.

The disparity in parental support presents an opportunity to explore literacy-numeracy intervention models that involve families (parental involvement) in the buffer zone, as an effort to support the sustainability of school programs. Schools identify weaknesses in literacy and numeracy and develop programs to overcome average levels and comfort zones (Kusuma, 2022). Other actionable developments include developing AI-based digital learning strategies (such as the use of chatbots or adaptive learning) to enhance students' critical thinking skills in person at school. This technological adaptation will facilitate interactive exercises (Pratiwi, 2022). Transforming learning quality (a challenge particularly in Central Java) will not be successful without instructional leadership from the principal (Hidayat, 2021; Wardono, 2022).

## CONCLUSION

This study confirms that accelerating secondary education quality relies heavily on harmonizing managerial policies with instructional flexibility. Through the Resource-Based View (RBV) framework, the Education Report Card acts as a strategic intangible asset that transforms data into valuable, rare, and inimitable pedagogical capabilities. However, a stark dichotomy exists: while public schools excel in digital assets due to systemic state support, suburban private schools suffer from a critical deficit in resource orchestration and human capital, leading to passive rote learning and student struggles with complex texts. Crucially, this study reveals that literacy and numeracy success is not merely a matter of physical facilities, but a result of dynamic capabilities specifically cross-subject synergy and teachers' mental well-being, where "math phobia" and mathematical anxiety act as severe psychological liabilities that deplete cognitive resources and disrupt knowledge transfer.

Practically, these findings demand the adoption of a "Cross-Disciplinary Integration" strategy to establish literacy and numeracy as a universal organizational capability. School authorities must reorient budgets to strengthen the human capital of non-exact science teachers, deliberately eliminating mathematical anxiety. Furthermore, classrooms must be transformed into visual information ecosystems that externalize and simplify everyday logical abstractions for students.

This study is limited to suburban contexts, meaning resource dynamics may differ significantly in well-funded urban centers. Additionally, the phenomena of teacher burnout and student math phobia have only been qualitatively described, leaving their direct statistical impact on school achievement indices unmeasured.

To address these limitations, the future research agenda should focus on developing and testing the "Peer Mentoring in the Recovery Room" model as an institutionalized professional clinic. Future studies must also investigate teacher collaboration in designing contextual materials (such as ethnomathematics) and

empirically examine the direct relationship between teachers' emotional stability and the authenticity of learning outcomes. This is critical to ensure that report card scores reflect true intellectual quality rather than mere superficial compliance with administrative targets.

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