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A QUARTER OF THE VARIANCE: THE LITERACY INDEX AND THE SCHOOL SYSTEM BESIDE IT

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ABSTRACT

Indonesia's community literacy development index shares at most a quarter of its variance with any published measure of its school system. The index is published without any reported relationship to the education statistics compiled by the same agency, so its convergent behaviour is unknown to its users. Using Central Statistics Agency figures for 2025 and 2023 across the thirty-three provinces with data on both, this article correlates the index against four school participation age bands, three completion levels and two supply ratios. The strongest association is with upper secondary completion, at 0.4963 on Pearson and 0.4900 on Spearman, which is 24.6 per cent of shared variance; the weakest is with participation at ages nineteen to twenty-three at 0.1866 and 0.2116. Provinces move an average of 7.94 rank places of thirty-three between the index and upper secondary completion. Nusa Tenggara Timur ranks ninth on the index and thirty-second on completion; Maluku ranks twenty-first and fourth. Jawa Barat, the most populous province in the country, ranks twenty-ninth of thirty-three on the index while ranking eighteenth on completion and twenty-second on participation at ages sixteen to eighteen. The article argues that the index and the school statistics are not measuring the same underlying quantity, that neither is thereby invalidated, and that the index should not be treated as a summary of educational provision.

1. INTRODUCTION

The Central Statistics Agency publishes a community literacy development index by province, and the index is naturally read as a summary of how well a province educates its people. Schooling is where literacy is acquired, so a province with a strong school system should score well.

The relationship is weaker than that reading assumes. Across the thirty-three provinces with data on both, the index correlates with upper secondary completion at 0.4963 — its strongest association with any schooling measure — which is 24.6 per cent of shared variance. Its correlation with participation at ages nineteen to twenty-three is 0.1866.

The divergence appears in the rankings as well. Provinces move an average of 7.94 rank places of thirty-three between the index and upper secondary completion. Nusa Tenggara Timur, which has the widest primary-to-upper-secondary completion gap in Indonesia at 49.95 percentage points, ranks ninth of thirty-three on the literacy index.

This article documents the relationship across nine pairings and argues that it establishes something narrower than a criticism of either measure. The index and the school statistics are not

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measuring the same quantity, and the useful conclusion is that the index should not be substituted for a schooling measure or read as summarising one.

The research gap is that the index is published without any reported relationship to the education statistics compiled by the same agency, so its convergent behaviour is unknown to its users. This article reports it.

2. LITERATURE REVIEW

2.1 Convergent behaviour of educational measures

A first strand concerns whether measures of related constructs behave as though they were related.

O'Neill, Lauridsen, Ostengaard and Qvortrup (2023) review the validity evidence for a widely used teaching and learning questionnaire and find its use has outrun the evidence. White and Maher (2024) ask what a standardised observation system adds to an existing evaluation system, which is the incremental-information question this article poses for a literacy index against school statistics.

Goldhaber, Grout, Wolff and Martinkova (2021) assess the dimensionality and reliability of professional reference ratings, and Min and Aryadoust (2021) review the dimensionality of language assessment instruments; both conclude that measures often carry less independent structure than their design implies. Stals, Isac and Claes (2024) test multi-dimensionality and cross-national comparability directly.

Atasoy and Kaya (2022) synthesise formative assessment practices across studies and find a single term covering heterogeneous activity, which is the risk that any broadly named index runs.

2.2 Composite indices

A second strand concerns the construction of composites.

Adeleke and McSharry (2022) show that a national education index is well predicted by a small set of indicators, the favourable case in which a composite behaves as a summary of separately measurable things. Wagner, Nair, Thapa and Kumar (2025) construct a learning inequality index intended for cross-context comparison.

Doz, Bone and Felda (2026) propose a multidimensional mathematics grade with an explicit aggregation rule, and Coates (2026) recovers latent structure from an international assessment rather than assuming it. Gates, Teasdale, Shim and Hubacz (2024) argue that evaluative criteria must be stated explicitly to be examinable.

A companion analysis of the same Indonesian index finds that it is not recoverable from the two dimensions published beside it, correlating with their average at 0.8506 while correlating with one dimension alone at 0.8568. The present article asks a different question — how the index relates to measures outside it — and the two findings are independent.

2.3 Literacy and schooling

A third strand concerns the relationship the index would be expected to display.

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Min and Aryadoust (2021) address the assessment of language ability, and Ghanbari and Abdolrezapour (2021) incorporate emotional intelligence into a writing assessment; both indicate that literacy is a construct with several defensible operationalisations. Nazari, Karimpour and Ranjbar (2023) treat assessment literacy as an ecology rather than a trait.

Sadoughi and Hejazi (2023) relate teacher support and mindset to engagement in second-language learning, and Zhang and An (2026) perceived classroom evaluation to deep learning through motivation and self-efficacy. Serrano-Ardila, Baena-Navarro and Carriazo-Regino (2026) propose a digital model for rural education, and Hall and Lundin (2024) evaluate classroom computers.

The reading environment an index of community literacy attempts to capture includes libraries, publishing, household reading and digital access, none of which is a school statistic. That the two should correlate imperfectly is expected; how imperfectly is the empirical question.

2.4 School measures as the comparison

A fourth strand concerns the schooling measures used here as the comparison set.

Ollikainen, Pekkarinen, Uusitalo and Virtanen (2024) estimate the effect of secondary education on cognitive and non-cognitive skills; Wongmonta (2023) and Liu, Xu, Zhang, Nie, Rule, Rozelle and Yuan (2024) price completed secondary credentials. Edmark (2025) shows that local supply shapes what students take, and Kelchen, Ortagus, Rosinger, Baker and Lingo (2023) that funding strategies shape access and success.

Armand, Herman and Honore (2024) decompose inequality of educational opportunity, and Sanfo and Malgoubri (2023) test whether instructional quality narrows socioeconomic gaps. Dearing, Zachrisson, Bustamante and Vandell (2026) examine the developmental timing of educational opportunity.

These establish that the school statistics used here — participation, completion and supply — are the standard measures of a school system and are the right comparison set for a claim about educational provision.

2.5 The research gap

The Indonesian community literacy development index has not been related to the school statistics published by the same agency. This article reports nine such relationships and the rank displacement they imply.

3. METHOD

Four Central Statistics Agency tables are used, all retrieved on 30 August 2026: Indeks Pembangunan Literasi Masyarakat dan Dimensi Penyusunnya Menurut Provinsi for 2025, covering thirty-three provinces; Angka Partisipasi Sekolah (APS) Menurut Provinsi dan Kelompok Umur for 2025, covering thirty-eight; Tingkat Penyelesaian Pendidikan Menurut Jenjang Pendidikan dan Provinsi for 2023, covering thirty-four; and Jumlah Desa yang Memiliki Fasilitas Sekolah Menurut Provinsi dan Tingkat Pendidikan for 2025, covering thirty-eight.

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The working population is the thirty-three provinces with an index value. Five provinces lack one — Bali and the four created in 2022 — and a companion analysis treats that absence directly.

Nine relationships are computed: the index against each of the four participation age bands, against each of the three completion levels, and against two supply ratios, being villages with a primary school per village with a general upper secondary school, and villages with a higher education institution per hundred with a primary school. Pearson and Spearman coefficients are reported for each.

Rank displacement is computed between the index and upper secondary completion, being the pairing with the strongest association, and is reported as a mean and for the largest cases.

Five limitations apply. First, the index scale and construction are not documented in the published table and a companion analysis finds it not recoverable from its own dimensions; the present article treats it as published without endorsing it. Second, the completion figures are for 2023 and the index for 2025. Third, five provinces are absent and the absence is not random. Fourth, correlation across thirty-three units establishes association and nothing more. Fifth, the article does not claim that either measure is invalid, only that they do not covary as closely as the reading it examines assumes.

4. RESULTS AND DISCUSSION

4.1 Nine relationships

Table 1 gives both coefficients for each pairing.

Table 1. The literacy index against school system measures, 33 provinces

School measure	Pearson	Spearman	Shared variance (Pearson)
Upper secondary completion	0.4963	0.4900	24.6%
Lower secondary completion	0.4618	0.3476	21.3%
Primary completion	0.4572	0.3342	20.9%
Participation, ages 16–18	0.4066	0.4398	16.5%
Participation, ages 7–12	0.3799	0.3422	14.4%
Supply ratio, primary to upper secondary	−0.3507	−0.3620	12.3%
Participation, ages 13–15	0.3122	0.3864	9.7%
Tertiary supply per hundred	0.2833	0.4492	8.0%
Participation, ages 19–23	0.1866	0.2116	3.5%

Computed by the authors from the four Central Statistics Agency tables named in Section 3, across the 33 provinces with an index value. The supply ratio is expected to correlate negatively, since a higher value means scarcer secondary provision. Shared variance is the square of the Pearson coefficient.

Every coefficient carries the sign that a positive relationship between literacy and schooling would predict. None is strong. The largest is 0.4963 against upper secondary completion, which leaves

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75.4 per cent of the index's variance unexplained by the schooling measure most closely associated with it.

The ordering is informative. The three completion measures occupy the top three positions and the four participation measures are spread through the lower half, which is consistent with a companion finding that completion is the sounder of the two indicator families. Supply enters weakly in both forms.

The weakest relationship, at 3.5 per cent shared variance, is with participation at ages nineteen to twenty-three. A province where many young adults are still in school is not a province with a high literacy index.

4.2 The rankings diverge

Table 2 reports the provinces whose position differs most between the index and upper secondary completion, which is the pairing with the strongest association.

Table 2. Largest rank displacements, literacy index against upper secondary completion

Province	Index rank	Completion rank	Index value	Move
Nusa Tenggara Timur	9	32	40.56	23
Maluku	21	4	30.18	17
Jawa Tengah	11	27	38.86	16
Kalimantan Selatan	27	12	25.16	15
Sulawesi Utara	28	15	22.18	13
Sulawesi Selatan	4	16	47.74	12

Computed by the authors from the literacy index and completion tables named in Section 3, across the 33 provinces with both. Rank 1 is the highest value on each measure; ranks run to 33. The mean absolute displacement across all 33 provinces is 7.94 places.

The mean displacement of 7.94 places is 24 per cent of the range of ranks. A reader who knew a province's index rank would place it, on average, eight positions from its completion rank.

Nusa Tenggara Timur is the largest single case and the most instructive. It ranks ninth of thirty-three on the literacy index and thirty-second on upper secondary completion, where it records 43.46 per cent. It also has the widest primary-to-upper-secondary completion gap in Indonesia at 49.95 percentage points. Whatever the index is registering there, it is not the performance of the school system.

Maluku is the reverse case, ranking twenty-first on the index and fourth on completion at 75.01 per cent. The displacement runs in both directions and is not a systematic offset.

4.3 The provinces where the two agree

The extremes agree even where the middle does not, and this is worth stating because it bounds the finding.

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DI Yogyakarta ranks third on the index at 48.05 and first on upper secondary completion at 89.69 per cent and on participation at ages sixteen to eighteen at 93.03. Papua ranks thirty-third on the index at 2.74 and thirty-third on completion at 39.50 per cent. Gorontalo ranks thirty-first on the index and thirty-first on completion.

Jawa Timur, which holds the highest index value at 56.29, ranks tenth on completion and eighth on participation at ages sixteen to eighteen — high on all three but not first on any.

The agreement at the extremes and disagreement in the middle is the signature of two measures that share a common component and differ substantially otherwise. It is also the reason the Pearson coefficients in Table 1 are as high as they are: a handful of provinces at each end carries the linear association, and the Spearman coefficients, which are lower for six of the nine pairings, register the looser agreement through the middle of the distribution.

The three pairings where the rank coefficient exceeds the product-moment one — participation at ages sixteen to eighteen, at thirteen to fifteen, and tertiary supply — are the cases where the relationship is monotone but curved rather than extreme-driven, and the largest of these gaps, 0.1659 for tertiary supply, is substantial.

4.4 The two supply relationships

The two supply measures behave differently from one another and from the outcome measures, which is worth a paragraph because supply is the variable a policy-maker can act on.

The school supply ratio — villages with a primary school per village with a general upper secondary school — correlates with the index at −0.3507 on Pearson and −0.3620 on Spearman. The sign is as expected, since a higher ratio means scarcer secondary provision, and the two coefficients agree closely, which indicates a relationship holding through the data rather than one created by the extremes.

The tertiary supply measure behaves quite differently. It correlates at 0.2833 on Pearson and 0.4492 on Spearman, a gap of 0.1659 with the rank coefficient the larger. This is the signature of a monotone but strongly curved relationship, and the likely cause is DKI Jakarta, which has 48.48 higher education institutions per hundred primary-school villages against 15.10 for the next province and an index value of 44.15, high but not the highest. A very large increment of tertiary provision at the top of the distribution does not carry a proportionate increment in the index.

On the rank measure, tertiary supply is the fourth strongest of the nine relationships rather than the eighth, which is how it appears on the Pearson ordering in Table 1. The ordering of Table 1 is given on Pearson for consistency, and this is the one row where that choice materially understates the association.

Neither supply relationship approaches the strength of the completion relationships. Where the index is tracking anything about provision, it is tracking outcomes rather than facilities.

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4.5 Jawa Barat

One province deserves separate treatment because it is the largest in Indonesia and because its position on the index is difficult to reconcile with anything else in the data.

Jawa Barat records an index value of 18.07, twenty-ninth of thirty-three. On the school measures it is unremarkable: eighteenth of thirty-three on upper secondary completion at 66.47 per cent, twenty-second on participation at ages sixteen to eighteen at 75.80 per cent, and a supply ratio of 2.64 villages with a primary school per village with an upper secondary school, which is the fourth densest provision in the country.

Its index dimensions are the second lowest in the country at 0.1930 and 0.1750, so the low index value is at least internally consistent with the components published beside it. The inconsistency is with everything outside the index.

A province of that size and with that provision scoring twenty-ninth of thirty-three on a literacy index is either registering something real that the school statistics do not capture — a reading environment, a library network, a publishing sector — or registering an artefact of how the index is compiled. The published table does not permit the two to be distinguished.

The case matters because Jawa Barat holds roughly a fifth of the Indonesian population. Any national aggregate of this index is heavily influenced by a value that no schooling measure would predict.

4.6 What the weak relationship does and does not establish

The result admits several readings and it is worth separating them, because they differ in what they would imply.

The first is that the index measures something genuinely distinct. Community literacy in the sense the index names includes library provision, reading habit and access to material, and a province may have good schools and thin library infrastructure or the reverse. On this reading the weak correlation is the expected result and is informative rather than troubling.

The second is that the index is noisy. A measure with substantial error correlates weakly with everything, including things it genuinely relates to, and the pattern in Table 1 is consistent with that. A companion analysis finding the index not recoverable from its own published dimensions lends this reading some weight.

The third is that the school measures are the problem. Participation and completion are coarse and a companion analysis finds them ranking provinces eight places apart on average; if neither captures educational quality well, a literacy measure that does capture it would correlate weakly with both.

The data cannot separate these. What they establish is narrower and still useful: whatever the index measures, it is not a summary of the school statistics, and a user who wants a schooling measure should use a schooling measure.

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4.7 What would settle it

The three readings in Section 4.6 are distinguishable in principle, and stating how is more useful than choosing between them on the present evidence.

The first reading — that the index measures a genuinely distinct construct — would be supported by the index correlating strongly with something outside the school system that it ought to track: library membership, book sales, household reading time, or a direct literacy assessment. Indonesia collects some of these and does not publish them by province in a form that permits the test. Yan and Pastore (2022) develop and validate a scale for a related construct, and the validation there consists of exactly such external comparisons.

The second reading — that the index is noisy — would be supported by year-to-year instability. A measure with substantial error moves provinces around between compilations without any underlying change, and two consecutive years of the index would show it. This is the cheapest of the three tests and requires only that the earlier table be retrieved.

The third reading — that the school measures are the weak party — would be supported by the index correlating better with a direct measure of learning than the school statistics do. Sanfo and Malgoubri (2023) work with learning achievement rather than enrolment, and Coates (2026) with a diagnostic model of assessment data; either would provide the criterion, and Indonesia participates in international assessments that could supply it at national but not provincial level.

None of the three is available from the published provincial tables, which is itself the finding a user should carry away: the index is in circulation and the evidence needed to interpret it is not.

4.8 Implications for practice

Four implications follow.

First, the index should not be used as a proxy for educational provision. It shares 24.6 per cent of its variance with its closest schooling relative and 3.5 per cent with the most distant, and provinces move an average of 7.94 rank places between it and upper secondary completion.

Second, where a study needs both, both should be included rather than one taken to stand for the other. They are not collinear: a regression including the index and upper secondary completion would not suffer from the redundancy that a 0.4963 correlation is often taken to imply.

Third, the provinces where the two diverge most are worth examining on their own terms. Nusa Tenggara Timur at ninth on the index and thirty-second on completion, and Maluku at twenty-first and fourth, are not measurement noise; each has some feature that one measure registers and the other does not.

Fourth, the exercise performed here is cheap and general. Where an agency publishes a composite index and separate sectoral statistics, correlating the two takes minutes and establishes what the index can be asked to stand for. Adeleke and McSharry (2022) perform the favourable version on an international index; the result there was reassuring, which is precisely why the check is worth running rather than assuming.

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4.9 The index against its own components, briefly

A reader may reasonably ask whether the weak external relationships documented here are inherited from a problem internal to the index, and the short answer is that the two are separable.

The index correlates with its own two published dimensions at 0.8568 and 0.8222 and with their simple average at 0.8506. Those are far higher than any of the nine external relationships in Table 1, whose maximum is 0.4963. Whatever the index is, it is much more closely tied to its own components than to anything in the school statistics.

This bears on the second reading in Section 4.6, that the index is simply noisy. A measure with substantial random error would correlate weakly with its own components too, and this one does not. The noise reading is therefore weakened, though not eliminated, since error shared between a composite and its components would not show up in an internal correlation.

It correspondingly strengthens the first reading, that the index is measuring something coherent and distinct. A measure that hangs together internally and tracks nothing in the school system is more likely to be capturing a different construct than to be capturing noise.

4.10 Limitations of the finding

Four limitations bound the result.

The article does not have the index methodology. Without knowing what the index counts, the finding that it does not track school statistics cannot be interpreted beyond the statement itself, and the first reading in Section 4.5 — that it measures something genuinely distinct — cannot be assessed.

Five provinces are absent and the absence is not random: four are the provinces created in 2022 and are among the lowest on every schooling measure available for them. Their inclusion would extend the lower tail of both variables and would probably raise the reported correlations, since the extremes are where the two measures agree.

The completion figures are for 2023 and the index for 2025. A province whose schooling changed between those years would show a spurious divergence, and the article cannot bound this.

Finally, thirty-three units support description and not much more. The rank displacements reported are computed on a small population, and no reference distribution is available against which a mean of 7.94 places could be tested.

5. CONCLUSION

Indonesia’s community literacy development index shares at most a quarter of its variance with any published measure of the country’s school system. Its strongest association is with upper secondary completion at 0.4963 on Pearson and 0.4900 on Spearman; its weakest is with participation at ages nineteen to twenty-three at 0.1866 and 0.2116.

The three completion measures occupy the top three positions among nine pairings and the four participation measures are spread through the lower half. Both supply measures enter weakly, at 12.3 and 8.0 per cent of shared variance.

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The rankings diverge accordingly. Provinces move an average of 7.94 rank places of thirty-three between the index and upper secondary completion. Nusa Tenggara Timur ranks ninth on the index and thirty-second on completion while holding the widest completion gap in the country; Maluku ranks twenty-first and fourth.

The extremes agree and the middle does not. DI Yogyakarta and Papua occupy the same position on both measures, and Jawa Barat — the most populous province in Indonesia, with the fourth densest upper secondary provision — ranks twenty-ninth of thirty-three on the index.

Three readings are available: that the index measures something genuinely distinct, that it is noisy, or that the school measures are themselves poor. The data do not separate them and the article does not claim to. What follows regardless is that the index is not a summary of school provision and should not be used as one.

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