

The Influence of Completion of Independent Training and Teacher Competency Reflection Scores on Elementary Students' National Assessment Results

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Abstract

The Merdeka Mengajar platform is a strategic initiative of the Ministry of Education, Culture, Research, and Technology of Indonesia, aimed at enhancing teacher competencies through self-directed learning and reflective assessment. Two key features of this platform, Independent Training (Pelatihan Mandiri) and Competency Reflection (Refleksi Kompetensi, Refkom), are designed to support teachers' professional development in a flexible and needs-based manner. This study examines the influence of Independent Training completion and Refkom scores on elementary students' performance in the 2023 National Assessment (Asesmen Nasional), covering literacy, numeracy, and character domains. The research population comprises elementary school teachers who participated in online Independent Training programs in 2022. Data were analyzed using linear regression, with school accreditation status included as a control variable. The results indicate that students taught by teachers who completed the Independent Training achieved significantly higher literacy and numeracy scores. Teachers' Refkom scores also had a positive effect on students' numeracy outcomes, although the relationship was not significant for character development. These findings suggest that strengthening teacher competencies through Independent Training and Refkom contributes meaningfully to improving the quality of student learning.

Keywords: teacher competency, independent training, competency reflection, national assessment, literacy, numeracy, elementary education

Abstrak

Platform Merdeka Mengajar merupakan inisiatif strategis Kementerian Pendidikan, Kebudayaan, Riset, dan Teknologi Indonesia, yang bertujuan untuk meningkatkan kompetensi guru melalui pembelajaran mandiri dan penilaian reflektif. Dua fitur utama platform ini, Pelatihan Mandiri dan Refleksi Kompetensi (Refkom), dirancang untuk mendukung pengembangan profesional guru secara fleksibel dan berbasis kebutuhan. Studi ini mengkaji pengaruh penyelesaian Pelatihan Mandiri dan skor Refkom terhadap kinerja siswa sekolah dasar dalam Asesmen Nasional 2023, yang mencakup ranah literasi, numerasi, dan karakter. Populasi penelitian terdiri dari guru sekolah dasar yang mengikuti program Pelatihan Mandiri daring pada tahun 2022. Data dianalisis menggunakan regresi linier, dengan status akreditasi sekolah dimasukkan sebagai variabel kontrol. Hasil penelitian menunjukkan bahwa siswa yang diajar oleh guru yang menyelesaikan Pelatihan Mandiri mencapai skor literasi dan numerasi yang jauh lebih tinggi. Skor Refkom guru juga berpengaruh positif terhadap hasil numerasi siswa, meskipun hubungannya tidak signifikan terhadap pengembangan karakter. Temuan ini menunjukkan bahwa penguatan kompetensi guru melalui Pelatihan Mandiri dan Refkom memberikan kontribusi yang signifikan terhadap peningkatan kualitas pembelajaran siswa.

Kata kunci: kompetensi guru, pelatihan mandiri, refleksi kompetensi, asesmen nasional, literasi, numerasi, pendidikan dasar



INTRODUCTION

The *Merdeka Mengajar* Platform (PMM) is a strategic policy initiative launched by the Indonesian Ministry of Education, Culture, Research, and Technology as part of the broader *Merdeka Belajar* (Freedom to Learn) framework. The platform was designed to support teachers' continuous professional development through access to learning resources, self-paced training modules, and competency-based reflective assessments (Ministry of Education, Culture, Research, and Technology, 2022). Among the core features of this platform are *Independent Training* (*Pelatihan Mandiri*) and *Competency Reflection* (*Refleksi Kompetensi*, Refkom), each functioning as a mechanism to enhance teachers' pedagogical capacity and self-diagnostic competence development.

The *Independent Training* feature enables teachers to engage with microlearning modules that are adaptable to individual needs, schedules, and school contexts. This flexible approach is particularly significant in addressing the challenges of teacher workload and unequal access to professional development across Indonesia's diverse educational landscape. Meanwhile, *Competency Reflection* serves as a formative assessment tool that helps teachers recognize their strengths and areas for improvement across professional, pedagogical, social, and personal competency dimensions. The outcomes of this reflection process guide teachers in developing targeted self-improvement plans that have a direct impact on classroom practices and student learning (Ministry of Education, Culture, Research, and Technology, 2023).

A substantial body of research has demonstrated that teacher competence plays a decisive role in determining student learning outcomes. Effective teaching strategies, adaptive classroom management, and the ability to tailor instruction to diverse learner needs have been linked to higher levels of student motivation, engagement, and academic achievement (Siregar & Sari, 2020; Nasution, 2021). At the elementary level, the teacher's role as a facilitator of learning is particularly crucial, as students at this stage are developing foundational literacy and numeracy skills that shape their long-term academic trajectories (Suhartono, 2022).

Several Indonesian studies have highlighted the positive effects of contextually relevant teacher training programs. Rachmawati and Hidayat (2021), for example, found that localized professional development initiatives improved student learning outcomes in remote and disadvantaged regions. Similarly, Wibowo et al. (2022) emphasized that reflective assessment fosters adaptive and responsive teaching practices aligned with students' evolving needs. Despite these promising findings, most existing studies have focused on conventional or face-to-face training formats, leaving a research gap in understanding the influence of digital-based professional development programs, such as *Independent Training* and *Refkom* on student learning outcomes measured through national assessments.

The emergence of technology-enhanced professional learning platforms has been accelerated by the COVID-19 pandemic, which disrupted traditional modes of teacher training. This global shift underscored the need for flexible, scalable, and data-driven approaches to teacher capacity building (OECD, 2021). Digital platforms such as PMM represent a transformative opportunity for Indonesia to decentralize professional learning, promote lifelong learning among teachers, and ensure that professional development is aligned with evidence-based needs analysis. Evaluating the effectiveness of such platforms, therefore, is vital to ensuring the sustainability of educational reforms in the post-pandemic era.

The *National Assessment* (*Asesmen Nasional*, AN), implemented nationwide since 2021, offers a robust framework to evaluate student learning outcomes and the broader impact of educational policy. AN measures three core domains, namely literacy, numeracy, and character, which reflect both cognitive and socio-emotional aspects of learning. These indicators are designed to assess not only students'

mastery of academic content but also the quality of learning processes and the overall climate of educational institutions (Educational Assessment Center, 2021). According to Arifin and Lestari (2023), AN can serve as an effective proxy for assessing the impact of teacher competency interventions and broader educational policy initiatives.

Despite the growing relevance of digital professional development, empirical evidence linking the completion of *Independent Training* and teachers' *Competency Reflection* scores to student performance on the National Assessment remains limited. This research seeks to fill that gap by providing empirical insights into the extent to which teacher engagement with PMM's learning features contributes to measurable improvements in student outcomes.

Specifically, this study aims to investigate two key research questions:

1. Does the completion of *Independent Training* by elementary school teachers significantly affect students' performance in the *National Assessment*?
2. Do teachers' *Competency Reflection* scores influence students' literacy, numeracy, and character outcomes?

To address these questions, this study employs a linear regression approach with school accreditation status as a control variable. By examining the intersection of teacher professional learning, digital innovation, and student achievement, this research contributes to the growing discourse on evidence-based teacher development and the role of data-driven platforms in enhancing educational quality.

Ultimately, this study seeks to provide empirical support for Indonesia's ongoing transformation toward a more autonomous, reflective, and competency-oriented education system. The findings are expected to inform policymakers, school leaders, and educators about the potential of digital professional learning ecosystems such as PMM to drive sustainable improvements in teaching practices and student learning outcomes at the elementary level.

RESEARCH METHOD

2.1 Research Design

This study employed a quantitative approach with an *ex post facto* design. The purpose was to examine the relationship between teacher competence, represented by the completion of *Independent Training* and *Competency Reflection* (Rekom) scores, and students' performance in the *National Assessment* (AN). The *ex post facto* design was chosen because all relevant data had already been collected and no direct intervention was applied to the research variables. This design allows researchers to explore relationships between existing variables in natural conditions.

2.2 Population and Data Sources

The population consisted of elementary school teachers who participated in online *Independent Training* through the *Merdeka Mengajar* Platform in 2022. Data were drawn from two main sources. The first source was teacher activity records on the platform, which included information about the completion status of *Independent Training* and the results of *Competency Reflection*. The second source was the 2023 *National Assessment* results of students, which covered literacy, numeracy, and character domains.

The total sample included 2,729 teachers and their corresponding students with complete and verified data. Verification was carried out to ensure accuracy and consistency between the PMM training data and student assessment results.

2.3 Variables

The study involved three categories of variables.

a) Independent variables:

- Completion of *Independent Training* (PM_completed), a binary variable coded 1 if the teacher had completed the training and 0 if not.

- Average *Competency Reflection* score (Mean_Refkom), representing the teacher's self-assessed competence across professional, pedagogical, social, and personal dimensions.
- b) **Dependent variables:**
 - Students' *National Assessment* results in literacy (AN_LIT_2023), numeracy (AN_NUM_2023), and character (AN_KAR_2023).
- c) **Control variable:**
 - School accreditation category (Accreditation_Category), coded according to the school's official accreditation status: A, B, C, or Not Accredited. This variable was included to control for institutional differences that may affect learning outcomes.

2.4 Analytical Procedure

The data were analyzed using multiple linear regression for each of the three National Assessment domains. The first model tested the effect of Independent Training completion on student results, while the second model tested the effect of Competency Reflection scores. School accreditation was included as a control variable in both models to isolate institutional effects.

All data processing and statistical analysis were performed using STATA version 17, chosen for its capability to handle categorical variables, multivariate regression, and statistical validation efficiently. Statistical significance was determined at the 95 percent confidence level ($\alpha = 0.05$). The interpretation focused on regression coefficients and p-values to identify the strength and direction of each relationship.

RESULT AND DISCUSSION

3.1 Effect of Independent Training Completion on National Assessment Results

The regression results show that teachers' completion of *Independent Training* has a significant effect on students' literacy achievement. The variable **PM_completed** has a coefficient of **1.34** with a *p*-value of **0.009**, indicating statistical significance at the 95 percent confidence level. This means that students taught by teachers who had completed *Independent Training* scored 1.34 points higher in literacy compared to students taught by teachers who had not completed the training.

The control variable representing school accreditation (**Accreditation_Category**) was not statistically significant in this model. This finding suggests that institutional accreditation status does not substantially differentiate literacy outcomes among students.

Table 1. Regression Results: Effect of Independent Training Completion on Student Literacy

AN_LIT_2023	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
PM_selesai	1.341153	.5096918	2.63	0.009	.3417311	2.340575
akreditasi_cat						
A	11.97533	10.7144	1.12	0.264	-9.033855	32.98451
B	7.55838	10.71179	0.71	0.480	-13.44568	28.56244
C	2.868429	10.73328	0.27	0.789	-18.17777	23.91463
Tidak Terakreditasi	7.630871	10.9864	0.69	0.487	-13.91166	29.1734
_cons	50.43	10.70793	4.71	0.000	29.4335	71.4265

In the numeracy domain, **PM_selesai** also shows a significant positive effect, with a coefficient of **1.10** and a *p*-value of **0.038**. This indicates that completion of *Independent Training* contributes positively to students' numeracy performance. The

magnitude of improvement is consistent with the literacy model, although the R-squared value is relatively low (0.0233), implying that other unobserved factors may also influence variations in numeracy outcomes.

Similar to the literacy model, the school accreditation variable was not significant. This reinforces the interpretation that teacher competence, rather than institutional status, plays a more critical role in determining student performance.

Table 2. Regression Results: Effect of Independent Training Completion on Student Numeracy

AN_NUM_2023	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
PM_selesai	1.10294	.5316106	2.07	0.038	.0605386	2.145341
akreditasi_cat						
A	10.78463	11.17517	0.97	0.335	-11.12803	32.69729
B	8.841336	11.17244	0.79	0.429	-13.06599	30.74866
C	4.587661	11.19485	0.41	0.682	-17.36361	26.53893
Tidak Terakreditasi	6.800062	11.45886	0.59	0.553	-15.66888	29.269
_cons	37.84	11.16842	3.39	0.001	15.94057	59.73943

For the character domain, the coefficient for **PM_selesai** is **1.20** with a *p*-value of **0.086**, which indicates a positive but statistically non-significant relationship. This suggests that while the direction of the relationship is positive, completion of *Independent Training* does not yet have a strong or consistent impact on students' character outcomes. Character development as measured by the *National Assessment* tends to be influenced by contextual factors such as school culture, social interactions, and daily behavioral practices. Consequently, teacher academic competence alone may not fully explain variations in this domain.

Table 3. Regression Results: Effect of Independent Training Completion on Student Character

AN_KAR_2023	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
PM_selesai	1.20125	.7004207	1.72	0.086	-.1721601	2.574659
akreditasi_cat						
A	2.272546	14.72378	0.15	0.877	-26.59836	31.14345
B	-1.099742	14.72019	-0.07	0.940	-29.96361	27.76413
C	-.5547769	14.74972	-0.04	0.970	-29.47655	28.36699
Tidak Terakreditasi	3.866118	15.09756	0.26	0.798	-25.73771	33.46995
_cons	49.04	14.71489	3.33	0.001	20.18653	77.89347

Overall, these results demonstrate that completion of *Independent Training* by teachers has a consistent and statistically significant influence on elementary students' literacy and numeracy outcomes. Although the relationship with character outcomes is not statistically significant, the positive direction suggests a potential contribution of teacher professional growth to students' socio-emotional development.

The non-significance of the school accreditation variable across all models strengthens the argument that formal institutional quality indicators are not the primary determinants of student performance. Instead, the findings highlight that teacher-focused interventions through self-paced professional development have a tangible

effect on improving cognitive outcomes, particularly in foundational areas measured by literacy and numeracy.

These findings are consistent with prior studies showing that teacher professional learning directly supports student academic success (Siregar & Sari, 2020; Wibowo et al., 2022). Moreover, the results align with the premise of the *Merdeka Belajar* reform, which emphasizes teacher autonomy and continuous competency improvement as drivers of educational quality.

3.2 Effect of Competency Reflection Scores on National Assessment Results

The regression model examining teachers' *Competency Reflection* (Refkom) scores also reveals a positive association with student outcomes. For the literacy domain, the Refkom score shows a coefficient of **0.60** with a *p*-value of **0.061**. Although this result does not reach the conventional level of statistical significance ($\alpha = 0.05$), it indicates a near-significant positive trend. In practical terms, higher reflection scores tend to be associated with better literacy outcomes, suggesting that teachers who engage more deeply in self-assessment may demonstrate more effective literacy instruction, even if the effect size is modest.

The control variable of school accreditation again remains non-significant, supporting the earlier conclusion that institutional status does not substantially differentiate literacy performance.

Table 4. Regression Results: Effect of Competency Reflection Scores on Student Literacy

AN_LIT_2023	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
RERATA_REFKOM	.6041879	.3225387	1.87	0.061	-.0282575	1.236633
akreditasi_cat						
A	11.9931	10.72168	1.12	0.263	-9.030361	33.01655
B	7.520336	10.71919	0.70	0.483	-13.49823	28.53891
C	2.799612	10.74064	0.26	0.794	-18.26102	23.86024
Tidak Terakreditasi	7.533169	10.99423	0.69	0.493	-14.0247	29.09104
_cons	48.75006	10.7521	4.53	0.000	27.66696	69.83317

In the numeracy domain, the impact of the Refkom score is stronger and statistically significant. The regression coefficient is **1.08** with a *p*-value of **0.001**, indicating a clear and positive correlation between teachers' reflective competence and students' numeracy achievement. This suggests that teachers who demonstrate higher levels of reflective understanding of their professional and pedagogical competencies are more effective in facilitating students' logical and quantitative reasoning. The effect size observed for numeracy exceeds that of literacy, reflecting the possibility that self-reflection encourages teachers to apply more structured and analytical teaching strategies that directly benefit numeracy skills. As in the previous models, school accreditation remains non-significant, underscoring the dominant role of teacher competence in influencing student achievement.

Table 5. Regression Results: Effect of Competency Reflection Scores on Student Numeracy

AN_NUM_2023	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
RERATA_REFKOM	1.084116	.3358223	3.23	0.001	.4256241	1.742609
akreditasi_cat						
A	10.49307	11.16325	0.94	0.347	-11.39623	32.38236
B	8.527562	11.16065	0.76	0.445	-13.35665	30.41177
C	4.280582	11.18299	0.38	0.702	-17.64742	26.20858
Tidak Terakreditasi	6.418931	11.44702	0.56	0.575	-16.02679	28.86465
_cons	34.82563	11.19492	3.11	0.002	12.87423	56.77703

For the character domain, the Refkom score has a coefficient of **0.26** with a *p*-value of **0.563**, indicating no statistically significant relationship between teachers' reflective competency and students' character development. This finding is consistent with the results for *Independent Training*, suggesting that character formation is shaped more by school culture, peer relationships, and daily interactions than by measurable aspects of teacher professional reflection.

Table 6. Regression Results: Effect of Competency Reflection Scores on Student Character

AN_KAR_2023	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
RERATA_REFKOM	.256045	.4431688	0.58	0.563	-.6129361	1.125026
akreditasi_cat						
A	2.437114	14.73161	0.17	0.869	-26.44915	31.32338
B	-.9966655	14.72819	-0.07	0.946	-29.87622	27.88289
C	-.4948011	14.75766	-0.03	0.973	-29.43214	28.44254
Tidak Terakreditasi	3.924644	15.10609	0.26	0.795	-25.69591	33.5452
_cons	48.32807	14.77341	3.27	0.001	19.35985	77.29629

The overall pattern of results indicates that teachers' *Competency Reflection* scores are significantly associated with students' numeracy performance and show a positive tendency toward literacy outcomes. Although the influence on character outcomes is not significant, the consistent direction of effects supports the notion that reflective practice contributes to the overall quality of instruction.

The strongest effect observed in numeracy highlights the importance of reflective awareness of professional and pedagogical competencies. When teachers consciously evaluate their teaching strengths and areas for improvement, they are better equipped to implement strategies that foster problem-solving, reasoning, and mathematical understanding in students.

The non-significance of school accreditation across all models once again emphasizes that teacher competency development, rather than institutional reputation, is the more relevant predictor of student learning outcomes. This finding is in line with Arifin and Lestari (2023), who argue that teacher-level factors explain more variance in student assessment results than school-level characteristics.

In summary, the analysis provides robust evidence that improving teacher competencies through *Independent Training* and reflective assessment can lead to measurable improvements in students' literacy and numeracy performance. Although the effects on character development are not yet significant, the positive trend suggests that strengthening teacher reflection and professional learning may gradually contribute

to more holistic student outcomes. These results reaffirm the strategic importance of the *Merdeka Mengajar* Platform as an instrument for enhancing teacher quality and supporting Indonesia's broader educational transformation toward more autonomous, data-informed, and competency-based learning.

CONCLUSIONS

This study demonstrates that teachers' completion of Independent Training and their Competency Reflection (Refkomp) scores have meaningful associations with elementary students' performance in the National Assessment (Asesmen Nasional). Completion of Independent Training has a statistically significant positive effect on students' literacy and numeracy outcomes, while Competency Reflection scores show a significant effect particularly in the numeracy domain. Although the influence on students' character outcomes is not statistically significant, the direction of the relationship remains positive and consistent across models.

These findings reinforce the position of the *Merdeka Mengajar* Platform as a policy instrument that extends beyond administrative functions to directly enhance the quality of teaching and learning. The non-significance of the control variable representing school accreditation in all models indicates that improvements in teacher competence are more decisive than formal institutional status in explaining variations in student learning outcomes.

From an operational perspective, the results provide a strong foundation for strengthening policies related to digital and self-directed professional development for teachers. The evidence suggests that capacity-building initiatives such as Independent Training and Competency Reflection can serve as effective mechanisms for promoting teacher professionalism and student achievement.

Future efforts should focus on systematically integrating Competency Reflection outcomes into teacher self-development planning at both the individual and institutional levels. Moreover, the utilization of data generated from the *Merdeka Mengajar* Platform should be incorporated into quality assurance and learning evaluation processes within schools. Such integration will enable data-driven decision-making and ensure that teacher development initiatives are aligned with actual learning needs and student performance patterns.

Overall, this research highlights that empowering teachers through flexible, digital, and reflective professional learning pathways contributes meaningfully to improving the foundational competencies of students. Strengthening the implementation and monitoring of these initiatives will be essential for sustaining the long-term goals of Indonesia's *Merdeka Belajar* transformation agenda.

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