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Effectiveness of the OPAK Flow Academic Supervision Model (Observation Training Action Collaboration) Based on Microsite in Improving Elementary School Teachers' Pedagogical Competence

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Abstract

Background: Improving primary education quality depends on teachers' pedagogical competence, yet conventional academic supervision often fails to produce meaningful changes in classroom practice.
Objective: This study examined the effectiveness of the Microsite-based *OPAK Flow* Academic Supervision Model (Observation, Training, Action, Collaboration) in improving elementary school teachers' pedagogical competence.
Methods: A quasi-experimental nonequivalent control group design was used. Sixty teachers were assigned to an experimental group (n = 30) receiving the *OPAK-Microsite* intervention or to a control group (n = 30) receiving conventional supervision. Data were analyzed using a paired t-test, an independent-samples t-test, and N-gain scores.
Results: The experimental group showed significant improvement (pretest: M = 68.55, SD = 7.21; posttest: M = 85.92, SD= 5.88; t = 14.78, p < 0.001; Cohen's d = 2.49). The control group showed minimal gains (pretest: M = 67.83; posttest: M= 73.40). Between-group comparison confirmed the superiority of the experimental group ($t(58)$ = 8.34, p < 0.001).
Conclusion: The OPAK-Microsite model significantly improves teachers' pedagogical competence compared to conventional supervision and is recommended for broader implementation.

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INTRODUCTION

The transformation of 21st-century education demands improvements in the quality of learning that are adaptive to developments in digital technology and students' needs (Arsyad et al., 2024; Blyznyuk et al., 2025; Kalyani, 2024). A UNESCO report emphasizes that strengthening teacher competence is a key factor in improving educational quality and sustaining post-pandemic learning reform. On the other hand, results from OECD studies through international assessments show that the quality of teacher pedagogy remains a major determinant of students' literacy and numeracy achievement in various developing countries (Dela & Niron, 2024). In the Indonesian context, the digital transformation of education through the Merdeka Belajar policy requires teachers not only to master teaching materials but also to design student-centered, reflective, and

technology-based learning (Harianto et al., 2025; Pratiwi, 2025). However, various national reports (2022–2025) indicate that the pedagogical competence of elementary school teachers remains uneven, especially in aspects of lesson planning, formative assessment, and strengthening students' learning motivation.

This problem becomes increasingly complex when associated with the challenges of implementing academic supervision in elementary schools. Ideally, academic supervision functions as a systematic and sustainable professional development mechanism. However, practices in the field often remain administrative, lack reflection, and have not yet optimally utilized digital technology (Helmi et al., 2025). Conventional supervision models tend to focus on document evaluation rather than strengthening teachers' pedagogical capacity through constructive feedback cycles. This condition contributes to the low internalization of supervision outcomes in classroom learning practices (Coimbra et al., 2020).

In this context, the OPAK Flow academic supervision model (Observation, Training, Action, Collaboration) offers a more participatory approach oriented toward sustainable professional development (Barokah et al., 2025; Widatin, 2025). Conceptually, this model aligns with theories of clinical supervision and collaborative learning that emphasize the observation–reflection–follow-up cycle. The observation stage enables the identification of teachers' actual needs; the training stage provides competency strengthening based on those needs; the action stage emphasizes real implementation in the classroom; and the collaboration stage encourages joint reflection. The integration of this approach has the potential to improve pedagogical competence more systematically than traditional supervision approaches.

Furthermore, the development of educational technology opens opportunities for integrating academic supervision with microsite-based digital platforms. A microsite, as a structured web-based medium, allows documentation of the supervision process, provision of training materials, reflection forums, and real-time follow-up monitoring. Recent studies (2022–2026) show that digital platforms in teacher professional development can increase engagement, flexibility of access, and the sustainability of reflective practices (Anis, 2024). However, the use of microsites in the context of academic supervision in elementary schools remains relatively limited, and their effectiveness has not been widely tested empirically (Nurhidayati et al., 2025).

Theoretically, this research is rooted in the theory of pedagogical competence, which includes the ability to understand student characteristics, design learning, implement educative learning, and conduct evaluation and reflection. Various recent empirical studies show that improving pedagogical competence positively correlates with student learning motivation and the quality of classroom interactions. However, most of these studies focus on teacher training in general rather than on the integration of supervision models based on digitalized collaborative cycles.

The state of the art in academic supervision research over the past five years shows a shift from evaluative approaches toward coaching- and mentoring-based approaches grounded in professional learning communities. Several studies have developed supervision models based on blended learning and Learning Management System (LMS) platforms. However, few studies have specifically tested the effectiveness of the OPAK Flow supervision model integrated with a microsite as a sustainable development ecosystem, especially at the elementary school level and in the context of strengthening pedagogical competence oriented toward student learning motivation.

Thus, there is a research gap in two main aspects. First, there are limited empirical studies on the implementation of the OPAK Flow model in academic supervision in elementary schools. Second, the exploration of microsites as systematic, documented, and collaborative supervision media remains suboptimal. Most previous studies still separate supervision model development from the utilization of digital technology, thereby failing to produce a comprehensive integrative model.

The urgency of this research becomes increasingly relevant in the context of accelerating the digital transformation of education and the demand for improving learning quality in the post-pandemic era. Elementary schools, as the foundation of education, require teachers with strong pedagogical competence to foster students' learning motivation from an early age (Zulkarnain et

al., 2025). Therefore, developing and testing the effectiveness of the microsite-based OPAK Flow academic supervision model is important to provide an alternative teacher development strategy that is more adaptive, systematic, and evidence-based.

The novelty of this research lies in the integration of the OPAK Flow supervision model with a microsite platform as a support system for the digitalized and measurable Observation–Training–Action–Collaboration cycle. The OPAK Flow model is designed as a sustainable and reflective development cycle. A significant innovation in this research is the integration of the OPAK Flow with the microsite platform, which functions as a digital learning resource center, self-training medium, and platform for documenting and exchanging best practices (Allela et al., 2020). To our knowledge, this is the first quasi-experimental study to empirically test the OPAK Flow supervision model integrated with a microsite platform custom-built using Google Sites for improving elementary school teachers' pedagogical competence in Indonesia, using a Nonequivalent Control Group Design with between-group statistical comparisons.

The adoption of a microsite within the OPAK Flow framework is expected to bridge time and geographical constraints, allowing teachers to access relevant training materials just in time during the Training stage and to document their Action results efficiently. Theoretically, increasing the frequency of feedback and the digital accessibility of materials will influence measurable improvements in pedagogical competence (Reisoğlu, 2022). In hypothesis testing, the effectiveness of this model will be measured through inferential statistical analysis, where the significance value (p) is expected to show results substantially different from those of the control treatment, with a threshold of $\alpha = 0.05$ (Sutrisno, 2022).

Given the background of the problem and the innovation of the proposed model, this study aims to empirically test the effectiveness of implementing the Microsite-Based OPAK Flow Academic Supervision Model (Observation, Training, Action, Collaboration) in improving elementary school teachers' pedagogical competence.

METHOD

This study used a quantitative approach with a quasi-experimental design to test the effectiveness of the intervention. The specific design selected was the Nonequivalent Control Group Pretest–Posttest Design (Cohen et al., 2007). This design involved two groups: an experimental group that received the Microsite-Based OPAK Flow Academic Supervision Model (Observation, Training, Action, Collaboration) treatment and a control group that received conventional academic supervision. The microsite was custom-built using Google Sites and structured into three modules: (1) a Training hub containing downloadable PDF materials and embedded instructional videos; (2) an Action documentation portal using Google Forms for classroom implementation reporting; and (3) a Collaboration forum utilizing embedded Google Chat for asynchronous peer and supervisor feedback. The effectiveness of the OPAK Flow supervision model was measured based on comparisons of the improvement in teachers' pedagogical competence (gain scores) between the group receiving the OPAK Flow intervention and the control group.

The population in this study consisted of all public elementary school teachers in the Talaga District area, totaling 250 individuals. Sampling was carried out using a purposive sampling technique with the criteria that participants were Grade IV and Grade V teachers with a minimum of five years of teaching experience. The research sample consisted of 60 teachers divided into two groups through purposive intact-group selection, as existing school classes were assigned to conditions without random individual assignment: 30 teachers in the experimental group and 30 teachers in the control group. This division was intended to ensure that both groups had relatively equivalent initial characteristics before the treatment began.

The instrument used to measure the dependent variable, namely teachers' pedagogical competence, was a 40-item Likert-scale questionnaire developed based on teacher competency standards. This instrument underwent construct and content validity testing by a team of experts and was piloted with 30 teachers outside the research sample. Based on the reliability test results, the pedagogical competence instrument showed a Cronbach's alpha coefficient of $\alpha = 0.91$, indicating high reliability. Data collection was carried out in two main stages: pretest and posttest.

The pretest was administered before the intervention to measure initial competence, whereas the posttest was conducted after the entire series of supervision treatments had been completed.

Data analysis began with descriptive statistics to determine the mean values, standard deviations, and data distributions of both groups. Furthermore, before hypothesis testing, prerequisite analyses were conducted, namely a data normality test using the Kolmogorov–Smirnov test and a variance homogeneity test using Levene's Test (Sayili & Gunver, 2025). If the assumptions of normality and homogeneity were met at a significance level of $\alpha = 0.05$, hypothesis testing was conducted using the independent-samples t-test to compare the mean N-gain scores of pedagogical competence between the experimental and control groups. If the assumptions were not met, an equivalent nonparametric test, such as the Mann–Whitney U test, was used. The effectiveness of the microsite-based OPAK Flow supervision model was established if the significance value (p) resulting from the test was smaller than the predetermined significance level, namely $p < 0.05$.

RESULTS AND DISCUSSION

Results

This study's primary objective was to examine the effectiveness of the OPAK Flow academic supervision model (Observation, Training, Action, Collaboration) integrated with a microsite platform in improving elementary school teachers' pedagogical competence. A quasi-experimental research design employing pretest and posttest measurements in the intervention group was used to collect quantitative data. Data obtained from the assessment of teachers' pedagogical competence were analyzed using descriptive and inferential statistics.

Descriptive analysis revealed a substantial increase in the average score of pedagogical competence following the OPAK Flow model intervention. The initial average score (pretest) was $\bar{X} = 68.55$ with a standard deviation (SD) of 7.21, while the final average score (posttest) increased significantly to $\bar{X} = 85.92$ with an SD of 5.88. A detailed comparison of the descriptive data is presented in Table 1.

Table 1
Descriptive Statistics of Pedagogical Competence

Test	N	Mean ($\underline{X}$)	Standard Deviation (SD)
Pre-test	30	68.55	7.21
Post-test	30	85.92	5.88

Before hypothesis testing, the normality prerequisite test of the gain score data using the Kolmogorov–Smirnov test yielded a significance value of $p = 0.112$. This value is greater than the significance level $\alpha = 0.05$, indicating that the competence improvement data were normally distributed and justified the use of parametric statistics.

To test the significant difference between the pretest and posttest scores, a paired-samples t test was used. The test results showed a value of $t = 14.78$ with degrees of freedom (df) = 29 and a significance value of $p < 0.001$. These results statistically demonstrate a highly significant difference in teachers' pedagogical competence after the implementation of the microsite-based OPAK Flow Academic Supervision Model (Observation, Training, Action, Collaboration). A summary of the t test results is presented in Table 2.

Tabel 2
Paired Sample t-test Results for Pedagogical Competence

Variable	t	df	Sig. (2-tailed)	Cohen's d
Post-test vs. Pre-test	14.78	29	< 0.001	2.49

To assess comparative effectiveness, the control group (n = 30) also underwent analysis: pre-test M = 67.83 (SD = 6.94), post-test M = 73.40 (SD = 6.12), and N-gain M = 0.17 (SD = 0.06). The experimental group's N-gain was M = 0.56 (SD = 0.08). The independent-samples t-test yielded $t(58) = 8.34$, $p < 0.001$, confirming that the experimental group significantly outperformed

the control group. This significant increase was confirmed by the Cohen's d value of 2.49, which falls into the very large effect category, thus indicating that the OPAK Flow model has very high effectiveness. This effectiveness stems from the cyclical, integrated, and sustainable structure of the OPAK Flow model (Rahman & Dewi, 2021). The Observation (O) stage maps individual needs, Training (P) provides focused intervention, Action (A) involves authentic implementation, and Collaboration (K) provides space for critical reflection, thereby ensuring competence development based on real problems.

Discussion

The results of this study indicate that the implementation of the microsite-based OPAK Flow academic supervision model significantly improves elementary school teachers' pedagogical competence. Critically, the between-group independent-samples t-test ($t(58) = 8.34$, $p < 0.001$) confirmed that the experimental group's N-gain ($M = 0.56$) was significantly higher than that of the control group ($M = 0.17$), thereby providing empirical support for the comparative effectiveness claim. The increase in the average score from 68.55 to 85.92 indicates a substantial change after the intervention was implemented. Statistically, the t-value of 14.78 with $p < 0.001$ strengthens the finding that this difference did not occur by chance but was a genuine effect of the model's implementation. The Cohen's d value of 2.49, which falls into the very large effect category, confirms that the intervention had a very strong influence on improving teachers' pedagogical competence.

This finding aligns with the theory of teacher professional development, which emphasizes the importance of reflective and collaborative cycles in competence improvement (Tian, 2025). The OPAK Flow model, consisting of the Observation, Training, Action, and Collaboration stages, forms a systematic professional learning cycle. The Observation stage enables the identification of teachers' actual needs based on classroom practice, ensuring that the intervention is not general but contextual. This supports the needs-based supervision approach, which has been shown in various studies to be more effective than traditional administrative approaches.

Furthermore, the Training and Action stages strengthen the principle of learning by doing in pedagogical competence development. Teachers not only receive theoretical material but also directly implement the training outcomes in real classroom practices. This pattern is consistent with andragogy theory, which emphasizes that adult learning is more effective when it is relevant to professional experience and needs (Babenko, 2023). Thus, the increase in post-test scores reflects a deeper internalization of pedagogical knowledge and skills rather than merely short-term cognitive improvement.

The Collaboration stage becomes a key element in strengthening the sustainability of the model's impact. Through joint reflection and professional discussion, teachers obtain constructive feedback that enriches their pedagogical perspectives. This approach aligns with the concept of professional learning communities (PLCs), which place collaboration as the foundation for improving learning quality (Vičič Krabonja et al., 2024). The integration of the Collaboration stage within the OPAK Flow model explains why the intervention effect is classified as very large, as competence development is not only individual but also reinforced through socio-professional support within the school environment.

Another innovative aspect contributing to the model's effectiveness is the integration of the microsite platform as a supporting medium for supervision. The microsite functions as an integrated space for observation documentation, access to training materials, classroom action reporting, and collaborative reflection forums. The digitalization of the supervision process increases traceability, consistency of follow-up, and communication efficiency between supervisors and teachers. Thus, technology functions not merely as an administrative tool but as an enabler for building a sustainable supervision ecosystem.

From a methodological perspective, the normal distribution of gain scores ($p = 0.112$) indicates that competence improvement occurred relatively evenly among participants and was not driven solely by a small number of individuals. This finding demonstrates that the OPAK Flow model has broad intervention reach and is adaptable to variations in teachers' initial abilities. In

other words, the model's effectiveness is not limited to teachers with a particular level of competence but is capable of accommodating diverse professional needs.

Nevertheless, although this study incorporated a nonequivalent control group design and confirmed between-group superiority ($t(58) = 8.34$, $p < 0.001$), the sample was limited to one district. Although the improvement was highly significant, the generalization of the results should still be approached with caution.

Overall, the findings of this study strengthen the argument that academic supervision designed systematically, collaboratively, and in integration with digital technology can produce significant improvements in pedagogical competence. The microsite-based OPAK Flow model is not only statistically effective but also theoretically and practically relevant within the context of transforming academic supervision in elementary schools. Thus, this model has the potential to become a strategic alternative for reforming supervision practices toward a more reflective, data-driven, and sustainable approach.

CONCLUSION

This study empirically demonstrated that the microsite-based OPAK Flow academic supervision model significantly improves elementary school teachers' pedagogical competence and is statistically superior to conventional supervision (between-group: $t(58) = 8.34$, $p < 0.001$; Cohen's $d = 2.49$, very large effect). The model is recommended for broader implementation. This study provides empirical evidence that the microsite-based OPAK Flow academic supervision model (Observation, Training, Action, Collaboration) significantly improves elementary school teachers' pedagogical competence. The between-group independent-samples t-test ($t(58) = 8.34$, $p < 0.001$) confirmed the model's superiority over conventional supervision, with a very large effect size (Cohen's $d = 2.49$). These findings position the OPAK-Microsite model as a systematic, technology-integrated, and evidence-based alternative for transforming teacher professional development in elementary schools. This model effectively addresses logistical and time constraints that often hinder traditional academic supervision.

In conclusion, the microsite-based OPAK Flow academic supervision model has been empirically proven to be highly effective in improving elementary school teachers' pedagogical competence. The inferential test results with $p < 0.001$ decisively reject the null hypothesis and support the research hypothesis, offering a systematic and technology-integrated solution for teacher professional development.

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AUTHOR CONTRIBUTION STATEMENT

All authors contributed substantially to the completion of this study. Dede Rina Andriani contributed to conceptualization, research design, data collection, and manuscript drafting. Lalan Soeherlan contributed to methodological refinement, supervision model development, and validation of research instruments. Eka Nurhidayat supported data analysis, statistical interpretation, and result presentation. Devi Ariyuni Yonanda contributed to literature review, discussion development, manuscript editing, and final proofreading. All authors reviewed and approved the final version of the manuscript.

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