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Reflective teaching skills development through classroom action research: enhancing pre service teachers' reflection on action in practicum

Dalimawaty Kadir[1], Andi Asari[2], Sofia Annisa[1]
[1] Universitas Muslim Nusantara Al-Washliyah
[2] Universitas Negeri Malang

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ABSTRACT

Reflective skills are essential competencies for pre-service teachers to drive continuous instructional improvement through critical evaluation. However, many candidates struggle to advance beyond basic descriptive processing. This study investigated the efficacy of a two cycle Classroom Action Research (CAR) intervention in systematically enhancing the reflective skills of 35 purposively sampled pre-service teachers during their teaching practicum. Data were gathered through a 10 item observation scale ($\alpha = 0.83$) and guided journals evaluated using a standardized rubric with strong inter-rater consensus ($\kappa = 0.80$). Quantitative diagnostics revealed a significant rise in overall reflective competence from a baseline mean of 2.70 ± 0.45 in Cycle I to 4.05 ± 0.32 in Cycle II. A paired-samples t-test confirmed this growth ($t = -18.72, p = 0.000$), supported by a moderate normalized gain (N-Gain = 0.56–0.62) and an exceptionally large effect size (Cohen's $d = 3.16$). Crucially, the intervention prompted a major behavioral shift across operationalized reflection levels: technical reporting (descriptive) plummeted from 68% to 18%, while diagnostic reasoning (analytical) grew to 52%, and holistic, theory to practice integration (critical) tripled from 10% to 30%. These findings demonstrate that CAR functions not merely as an inquiry design, but as a powerful pedagogical scaffolding strategy to cultivate higher order professional thinking in teacher education.

Corresponding Author:

Dalimawaty Kadir
Universitas Muslim Nusantara Al-Washliyah
Email: dalimawatykadir@umnaw.ac.id

Introduction

Reflective skills have increasingly been recognized as a core competency in teacher professional development, particularly in the context of 21st-century education. In contemporary educational practice, teachers are no longer positioned merely as transmitters of knowledge, but as reflective practitioners who are capable of critically evaluating their instructional practices, identifying areas for improvement, and implementing continuous pedagogical refinement. This perspective aligns with recent empirical frameworks on teacher professional growth, which emphasize reflection not merely as a retrospective act but as an active critical thinking process embedded directly within authentic classroom practice (Clarà, 2021; Korthagen, 2021). Subsequent developments in the literature have further expanded this concept, positioning reflection not only as an

individual cognitive activity but also as a structured and systematic component of professional learning (Farrell, 2018; Mann & Walsh, 2017).

Within teacher education, reflective skills play a crucial role in fostering metacognitive awareness among pre-service teachers, enabling them to understand, monitor, and evaluate their own teaching practices (Larrivee, 2008). Recent studies indicate that teachers with strong reflective capacities tend to be more adaptive to changing classroom dynamics, more responsive to students' needs, and more effective in designing meaningful learning experiences (Korthagen, 2017; Farrell & Kennedy, 2019). Consequently, the development of reflective skills has become a key indicator of quality in teacher education programs worldwide.

In the context of Indonesia's Teacher Professional Education Program, reflective competence constitutes an integral component of the expected learning outcomes for pre-service teachers. The teacher preparation curriculum is designed to graduate educators who are not only pedagogically competent but also capable of engaging in critical and reflective thinking about their teaching practices. However, empirical evidence suggests that the reflective abilities of these pre-service teachers remain relatively underdeveloped. Many candidates tend to engage in reflection at a descriptive level, merely recounting teaching experiences without conducting deeper analysis of underlying causes or pedagogical implications (Beauchamp, 2015; Korthagen, 2017).

This issue highlights a significant gap between the expected reflective competencies outlined in teacher education curricula and the realities of instructional practice. Reflection activities are often conducted in an unstructured and informal manner, limiting their effectiveness in fostering deep critical thinking. Furthermore, the lack of instructional models that explicitly integrate reflection into teaching practice has been identified as a major barrier to the development of reflective skills (Farrell, 2018; Zeichner & Liston, 2014). As a result, many pre-service teachers struggle to identify instructional weaknesses and formulate appropriate strategies for improvement. To address these challenges, there is a need for pedagogical approaches that systematically integrate teaching practice with structured reflection. One such approach is Classroom Action Research (CAR). CAR operates as an iterative, cyclical process of planning, action, observation, and reflection designed to elevate instructional quality through continuous, evidence based refinement (Edwards, Jones, & Williams, 2021; Smith, Davis, & Miller, 2022). Within this framework, reflection is not merely a concluding activity but a central component that informs each stage of the process.

A growing body of research highlights the potential of CAR in enhancing teaching quality and professional competencies. CAR enables teachers to actively engage in evidence-based evaluation and improvement of their instructional practices (Banegas & Consoli, 2021; Mertler, 2021). Moreover, CAR has been shown to be particularly effective in fostering reflective thinking, as it encourages teachers to connect theoretical knowledge with practical experience in a structured manner (Darling-Hammond et al., 2020). Despite these advantages, existing studies have predominantly focused on the impact of CAR on student learning outcomes or instructional effectiveness, with limited attention given to its role in developing reflective skills among pre-service teachers. Research examining the integration of CAR within the teaching practicum of pre-service teachers, especially across specific candidate categories, remains scarce. This gap in the literature indicates the need for further investigation into how CAR can be systematically utilized to enhance reflective competence in teacher education.

Based on this identified gap, the present study proposes a novel approach by positioning CAR not merely as a research method but as a structured reflective learning strategy. The novelty of this study lies in the systematic integration of CAR cycles with the development of reflective skills among pre-service teachers during their active teaching practice an area that has received limited empirical exploration. Furthermore, this study contributes to the development of an implementation model of CAR that explicitly focuses on enhancing critical reflection, thereby extending its function beyond instructional improvement to include professional capacity building among future educators. Considering these considerations, this study aims to analyze the effectiveness of implementing classroom action research in improving the reflective skills of pre-service teachers during teaching practice. The findings are expected to contribute both theoretically to the advancement of reflective learning frameworks in teacher education and practically to the improvement of instructional strategies within professional teacher training programs.

Method

This study employed a Classroom Action Research (CAR) design following the cyclical framework outlined by Kemmis, McTaggart, and Nixon (2014), which integrates four continuous phases: planning, action, observation, and reflection. While CAR conventionally targets secondary student learning outcomes, this research adapts the model to teacher education to systematically enhance and track the reflective growth of pre-service teachers

through repeated professional practice. The intervention spanned exactly two cycles. This timeframe was determined by data saturation logic (Saunders et al., 2018); by the end of the second cycle, the qualitative themes from written journals and quantitative scores from observation rubrics reached an informational redundancy, showing no novel shifts in reflective depth or instructional adaptation.

The research was embedded within the Indonesian Teacher Professional Education Program (Pendidikan Profesi Guru), focusing specifically on pre-service teachers. A total of 35 pre-service teachers participated in the study, selected via purposive sampling based on their active deployment in school-based teaching practicums. This sample size of 35 accounts for the entire intact cohort in the targeted teaching field. While meeting the natural operational limits of action research, this sample size provides more than sufficient statistical power for non parametric and descriptive trend diagnostics in small group institutional settings (Creswell & Creswell, 2018). The action cycles followed a highly structured protocol. During planning, lesson plans were collaboratively built to embed explicit reflective checkpoints. In the action phase, pre-service teachers managed live classroom sessions. The observation phase relied on systematic monitoring of teaching performance via structured sheets, and the final reflection phase required participants to critique their own sessions using guided journals.

To ensure reproducibility, the data collection instruments are defined by explicit operational protocols. Classroom performance and reflective actions were evaluated using a 10-item structured observation sheet scored on a 4-point Likert scale (ranging from 1 = Unsatisfactory to 4 = Exemplary). Concurrently, the qualitative reflective journals utilized a three-tiered prompt scheme designed to elicit descriptive, analytical, and critical reflection layers (Larrivee, 2008; Farrell, 2018). All instruments underwent rigorous psychometric evaluation prior to deployment. Content validity was established by three independent experts in teacher training, resulting in a Content Validity Index (CVI) of 0.92 for the observation sheet and 0.88 for the reflective journal rubric. The internal consistency of the observation items was pre-tested with an independent pilot cohort, yielding a strong Cronbach's alpha (α) of 0.83.

To turn qualitative journal entries into quantifiable data, we used a standardized rubric evaluating four areas: experience description, critical analysis, efficacy evaluation, and strategic planning (Korthagen, 2017). To eliminate evaluator bias, two independent researchers coded the journals. Inter-rater reliability was calculated using Cohen's kappa (κ), demonstrating high scoring consensus with an overall coefficient of 0.80. The full observation rubric and the journal coding schemes are provided in Appendix A and Appendix B to facilitate future replication.

Data analysis combined descriptive quantitative tools and qualitative thematic coding. Quantitative metrics from the observation rubrics were handled through descriptive statistics to monitor performance curves across cycles. Qualitative journal data were processed via thematic analysis, utilizing data reduction, display, and conclusion drawing steps (Miles, Huberman, & Saldaña, 2014). Methodological triangulation was achieved by cross validating observation matrices, journal entries, and lesson plans (Lincoln & Guba, 1985). Credibility was further supported through peer debriefing and participant member checking (Creswell & Poth, 2018). Ethical protocols were strictly enforced, all pre-service teachers gave written informed consent, and personal identifiers were completely removed through anonymized coding.

Results and Discussions

This study evaluated how effectively Classroom Action Research (CAR) could improve the reflective skills of pre-service teachers during their teaching practice. The data indicate a clear and statistically significant advancement in the participants' reflective capabilities following the two-cycle CAR intervention. This growth is visible both qualitatively, through the depth and clarity found in their written reflections, and quantitatively, as marked by a steady rise in the average scores across every measured indicator. The statistical progression of the participants' skills from Cycle I to Cycle II is outlined in Table 1.

Table 1. Improvement of Students' Reflective Skills

Reflective Skill Aspect	Cycle I (Mean)	Cycle II (Mean)	Gain
Description of experience	3.1	4.2	+1.1
Instructional analysis	2.7	4.1	+1.4
Evaluation of teaching	2.6	4.0	+1.4
Improvement planning	2.5	3.9	+1.4
Overall Mean	2.7	4.05	+1.35

As detailed in Table 1, every dimension of reflective thinking showed positive gains between the two cycles. To confirm the reliability of the scoring rubric across these four specific dimensions, we calculated the inter-rater reliability using Cohen's kappa (κ). This resulted in strong to near perfect evaluator agreement, ranging between 0.76 and 0.82, with an overall consensus coefficient of 0.80. Furthermore, internal consistency testing for each subscale proved highly dependable, with Cronbach's alpha (α) values tracking well above the standard 0.80 benchmark across the board.

The cumulative mean score rose from 2.7 to 4.05. This shift reflects a clear transition among pre-service teachers from simple, descriptive reporting toward deeper analytical and critical thinking. The most notable progress occurred within instructional analysis, teaching evaluation, and improvement planning areas that directly rely on higher order cognitive skills.

Before running inferential statistics, we tested the data to ensure it met the necessary parametric assumptions. The Shapiro-Wilk test was applied to check for normality, showing that the distribution of difference scores did not deviate significantly from a normal curve ($W = 0.962$, $p = 0.254$, where $p > 0.05$). Following this verification, a paired sample t-test confirmed that the improvements were highly significant ($t = -18.72$, $p = 0.000$, where $p < 0.05$). This statistically isolates the CAR cycles as the primary driver of change rather than random variance.

To gauge the practical magnitude of this shift, we measured the effect size using Cohen's d. Driven by the substantial mean differences and controlled variance, the analysis yielded a Cohen's d of 3.16. An effect sizes this large indicates that the structured cycles had a definitive and transformative impact on how the participants processed their teaching experiences. A post-hoc power analysis further confirmed the adequacy of our sample size (n=35). Set against an alpha level of 0.05 and the observed effect size, the overall statistical power (1□ β) reached 1.00. This comfortably surpasses the conventional 0.80 minimum threshold, confirming the sample was fully capable of capturing true experimental differences while mitigating Type II error risks.

We also tracked growth pacing through normalized gain (N-Gain) scores. The calculated values sat within the 0.56 to 0.62 range, pointing to a moderate, steady upward trajectory. This tells us that while the overall changes were profound, mastering reflective habits is an incremental process that takes time, requiring continuous engagement and deliberate practice (Larrivee, 2008; Farrell, 2018).

Plotting these data points graphically reveals a steady, uninterrupted upward trend across all subscales, highlighting a well-rounded developmental process rather than uneven or isolated gains. Table 2 breaks down how the participants shifted across the different qualitative levels of reflection.

Table 2. Distribution of Reflective Levels

Reflection Level	Cycle I (%)	Cycle II (%)
Descriptive	68%	18%
Analytical	22%	52%
Critical	10%	30%

The distribution shifts in Table 2 emphasize this growth. During Cycle I, the vast majority of pre-service teachers (68%) focused heavily on descriptive accounts, offering little critical evaluation of their classroom experiences. By Cycle II, however, this descriptive cluster dropped sharply to 18%, while analytical and critical reflection tiers expanded noticeably. The fact that critical reflection jumped from 10% to 30% is a key finding; it underscores the participants' growing capacity to bridge theoretical knowledge with actual classroom dynamics and map out actionable pedagogical solutions.

Our qualitative records directly mirror these numerical shifts. Early journal entries from the pre-service teachers were quite brief and superficial, often leaning on generic catchphrases like the lesson went smoothly without exploring why. After the CAR interventions, their reflections became noticeably more organized and exploratory. The participants began parsing specific instructional bottlenecks, diagnosing root causes, and formulating clear alternatives for future lessons. This pivot away from surface observations toward deeper diagnostic analysis serves as an established hallmark of professional teacher maturity (Farrell & Kennedy, 2019).

These outcomes highlight how well CAR works as a supportive learning framework for evolving educators. By moving through deliberate, repeated cycles of planning, action, observation, and reflection, the pre-service teachers were consistently prompted to evaluate their own work. This process closely mirrors Schön's (1983)

paradigms of reflection in action and reflection on action, which champion the value of analytical thinking when it is woven directly into real time professional work.

Furthermore, the balanced progress seen across all four dimensions suggests that reflective sub skills do not develop in isolation. As the pre-service teachers sharpened their analytical focus, they naturally improved their capacity to evaluate outcomes and design proactive adjustments. This lends weight to the understanding that reflective capability is a holistic, multi layered trait that develops dynamically (Mann & Walsh, 2017). From a theoretical standpoint, this study supports the idea that reflective growth occurs best when anchored in real world teaching settings and guided by structured tools. CAR balances firsthand experience with structured inquiry, making it an ideal engine for this development. This aligns with a broad base of literature showing that action research deepens professional insights by forcing a continuous dialogue between theory and actual practice (Burns, 2010; McNiff, 2017).

On a practical level, these outcomes suggest that making CAR a foundational element within teacher training programs can noticeably elevate candidate preparation. Reflective analysis shouldn't be treated as an afterthought; it needs to be an intentional part of the curriculum, supported by clear grading rubrics, peer review, and guided debriefs (Cavanagh, 2021; Galvez & Flores, 2023; Ward & McCosker, 2022). Naturally, this study has its boundaries. While our sample of 35 participants yielded high statistical power due to the sheer size of the effect, the reliance on a single cohort and a two cycle timeline limits broader external generalizations. Future lines of research would benefit from broader, multi-institutional samples and longitudinal tracking to see how well these reflective habits hold up over a teaching career.

In conclusion, the alignment of robust statistical indicators including diagnostic tests and effect sizes with qualitative shifts provides strong evidence that classroom action research serves as a highly effective tool for cultivating reflective skills in pre-service teachers. This approach successfully elevates their thinking across descriptive, analytical, and critical boundaries, providing them with the professional habits needed for long term instructional success.

Conclusions

This study demonstrates that a structured Classroom Action Research (CAR) intervention effectively enhances the reflective skills of pre-service teachers during their teaching practice. Quantitatively, the intervention yielded a statistically significant increase ($p = 0.000$, $p < 0.05$) in overall reflective competence, with cumulative mean scores rising from 2.70 in Cycle I to 4.05 in Cycle II. The normalized gain scores (0.56 to 0.62) indicated moderate, progressive growth, while the calculated Cohen's d of 3.16 confirmed an exceptionally large practical effect size. Qualitatively, these metrics were mirrored by a substantial behavioral shift; participants successfully transitioned from superficial descriptive reporting (which dropped from 68% to 18%) to deeper analytical and critical evaluation. Theoretically, these findings reinforce the principle that reflective capabilities are best cultivated when embedded directly within authentic teaching environments and supported by structured rubric frameworks. Practically, integrating CAR into teacher preparation curriculum scaffolds higher order thinking and fosters an evidence-based approach to classroom instructional adjustments. Despite these contributions, this study is limited by its short duration and localized cohort. To establish broader external generalizability and examine the long-term sustainability of these reflective habits, future research should implement longitudinal tracking over a full academic year and involve larger, multi-institutional samples targeting a minimum of 150 pre-service teachers across diverse disciplines. Additionally, investigating the integration of digital e-portfolios could offer deeper insights into digitalized reflective practice for modern teacher education. In conclusion, CAR functions as an effective pedagogical strategy that builds the vital reflective habits necessary for continuous professional teaching success.

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