

Empowering Teachers' Professional Competence through the PIKOLAK Training Model (Participatory, Integrative, and Collaborative) with a Blended Learning Approach in Humbang Hasundutan Regency

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Abstract

This study applied a Research and Development (R&D) approach to design and evaluate the PIKOLAK Training Model Participatory, Integrative, and Collaborative—integrated with a blended learning format to improve teacher professional competence in Humbang Hasundutan Regency. The development process included needs analysis, model design, expert validation, and field testing. The blended learning structure combined face-to-face workshops with online modules, offering both flexibility and quality. Quantitative results showed a significant increase in teacher competency scores, rising from 65.2 (pre-test) to 83.7 (post-test) with $p < 0.01$. Qualitative data revealed enhanced teacher engagement, increased collaboration, and more effective teaching practices. Teachers expressed stronger ownership of their learning and found the program highly relevant to classroom needs. The model effectively blended adult learning principles with experiential and social learning theories, contributing to improved pedagogical outcomes. Overall, the PIKOLAK model proved to be a valid and practical framework for professional development, particularly in under-resourced areas. It offers scalable potential for broader use in similar educational contexts, ultimately supporting the advancement of teacher quality and student learning outcomes.

Keywords— PIKOLAK Model, Teacher Competence, Blended Learning, Professional Development

1. INTRODUCTION

Teacher professional competence is universally recognized as a central factor influencing student achievement and overall educational quality. As emphasized by Linda Darling-Hammond (2000), teacher preparation and ongoing professional development are among the most powerful predictors of student success, especially in under-resourced contexts. Professional development is not merely an individual endeavor but a foundational element of systemic education reform and equity. In regions like Humbang Hasundutan Regency, teachers often face barriers to accessing high-quality, sustainable training that equips them to meet evolving curricular demands and diverse student needs. Conventional one-time workshops typically lecture-based

and disconnected from teachers' daily realities have shown limited effectiveness in transforming classroom practice. As educational theory and practice have evolved, there is a growing consensus among scholars and practitioners (e.g., Knowles, Shulman, Bandura, Vygotsky) that professional learning must be dynamic, contextual, and rooted in active teacher engagement. In response to this need, the current study introduces the PIKOLAK Training Model an acronym for Participatory, Integrative, and Collaborative delivered through a blended learning approach. This model was developed to enhance teacher competence through structured, evidence-based professional learning experiences that are grounded in well-established educational theories.

The participatory element is influenced by Malcolm Knowles' Andragogy, which highlights adults' need to direct their own learning and engage with content that is immediately relevant to their roles. The integrative design draws on David Kolb's Experiential Learning Theory, ensuring that teachers experience, reflect, conceptualize, and apply knowledge in practical cycles of professional growth. The collaborative component is inspired by Lev Vygotsky's Social Constructivism and Albert Bandura's Social Learning Theory, promoting peer-supported learning through shared experiences, feedback, and modelling. Additionally, the program's competency-based orientation aligns with William Spady's Outcomes-Based Education, ensuring that all training content and activities are designed backward from clear, measurable teacher performance outcomes. Finally, the framework is shaped by Lee Shulman's concept of Pedagogical Content Knowledge (PCK), recognizing that effective teaching requires the integration of subject knowledge with pedagogical strategy tailored to learner needs. To operationalize these principles, the PIKOLAK model employs a blended learning format, combining face-to-face workshops with digital learning platforms. This approach allows teachers to engage in sustained, flexible, and context-relevant professional development especially critical in rural areas where logistical and technological constraints are common. This paper presents the development and evaluation of the PIKOLAK model, as implemented in Humbang Hasundutan. It outlines the theoretical foundations guiding the model, details the research and development process used to refine it, and reports empirical findings on its effectiveness in advancing teacher professional competence. By grounding this innovation in a rich body of educational theory and practice, the study aims to offer a replicable model for teacher development that can be scaled across similarly under-resourced contexts to improve instructional quality and promote educational equity.

II. REVIEW OF LITERATURE

The development of the PIKOLAK training model Participatory, Integrative, and Collaborative with a blended learning approach is based on a strong foundation of educational theories that are still highly relevant today. Each aspect of the model reflects the principles of respected scholars whose work continues to guide effective teacher development. These theories help ensure that the training is not only practical but also aligned with research on how adults learn and how professional growth occurs in education settings.

First, the collaborative dimension of the PIKOLAK model draws on Lev Vygotsky's Social Constructivist Theory (1978). Vygotsky introduced the concept of the Zone of Proximal Development (ZPD), which explains that learners can achieve more when they receive support from others who are more experienced. In the PIKOLAK context, teachers learn best when they interact with peers, share classroom experiences, and solve problems together. This approach encourages mutual growth and reflects the idea that learning is fundamentally a social process. Closely related to this is the influence of Albert Bandura's Social Learning Theory (1977), which highlights the importance of learning through observation, imitation, and feedback. Bandura's concept of self-efficacy the belief in one's ability to succeed is also vital. In the PIKOLAK program, teachers watch peers and facilitators model teaching practices, then try them out and receive feedback. This process helps build confidence and motivation, making teachers more willing to apply what they learn in their classrooms.

The integrative aspect of the model is grounded in David Kolb's Experiential Learning Theory (1984), which describes learning as a four-stage cycle concrete experience, reflective observation, abstract conceptualization, and active experimentation. PIKOLAK integrates these stages by allowing teachers to participate in teaching simulations (experience), reflect on them (observation), draw conclusions (conceptualization), and test ideas in real classrooms (experimentation). This ensures that learning is both practical and reflective, increasing the chance that teachers will transfer knowledge into their daily practice.

To support the development of effective teaching strategies, PIKOLAK incorporates the concept of Pedagogical Content Knowledge (PCK) proposed by Lee Shulman (1987). Shulman emphasized that excellent teaching depends on both content knowledge and the ability to present that content effectively. Within the training, teachers engage in tasks that link subject matter with teaching techniques, such as designing lesson plans and delivering peer-teaching sessions. This strengthens their capacity to teach specific subjects in ways that students can understand. Since the participants in this program are adult professionals, the model also follows the principles of Malcolm Knowles' Adult Learning Theory (Andragogy, 1984). Knowles argued that adults are self-directed, prefer learning that is relevant to their lives, and bring valuable experience to the learning process. PIKOLAK respects these principles by involving teachers in planning their own learning goals, using real classroom problems, and offering flexibility through its blended (online and face-to-face) approach.

The competency-based structure of PIKOLAK is strongly influenced by William Spady's Outcomes-Based Education (OBE) model (1994). Spady believed that all educational activities should be designed around clear, measurable outcomes. The training program defines specific teacher competencies that participants are expected to master, and every activity is aligned with these targets. This ensures that the learning process stays focused and relevant to teachers' professional roles.

Finally, the overall rationale for the PIKOLAK model is aligned with the research of Linda Darling-Hammond (2000; 2020), who has demonstrated that high-quality teacher development has a strong impact on student learning and educational equity. Her work supports long-term, collaborative, and practice-based professional development—qualities that are central to the PIKOLAK model. By investing in teacher capacity, especially in rural areas like Humbang Hasundutan, the training contributes to reducing educational disparities and improving student outcomes.

In conclusion, the PIKOLAK model is not just a collection of strategies, but a theoretically grounded framework. It integrates well-established ideas from leading scholars with current best practices in adult education and teacher development. By drawing on these foundations, the model provides an effective, sustainable path for improving teacher professional competence and, ultimately, student learning.

III. RESEARCH METHODOLOGY

This research utilized a Research and Development (R&D) approach to create and evaluate the PIKOLAK training model, aiming to strengthen teacher professional competence in Humbang Hasundutan Regency. R&D was chosen because it not only allows researchers to test educational interventions but also supports the creation and refinement of practical products, following iterative processes as emphasized by Borg and Gall (1983). The process consisted of five key stages: needs analysis, model design, expert validation, field testing, and evaluation.

The first step was a needs analysis to understand current gaps in teacher competencies and uncover specific areas in which teachers desired improvement. This included collecting data through surveys, interviews, and focus group discussions with teachers, principals, and education officials. This process aligns with Stufflebeam's (1983) CIPP model, particularly the Context evaluation, to determine what is needed and why. The analysis revealed a strong interest in practical and collaborative training programs, highlighting deficiencies in lesson planning, technology integration, and classroom management. These

findings informed the development of a model rooted in teacher needs and grounded in relevant theory.

Next, the design phase involved formulating the structure and content of the PIKOLAK model. The acronym Participatory, Integrative, and Collaborative captured its core philosophy. The model was designed to be delivered through a blended learning approach, combining in-person workshops and asynchronous online modules. The content was competency-based, aligned with national teaching standards (MoEC, 2017), and mapped to key educational theories: Lev Vygotsky's (1978) social constructivism, Albert Bandura's (1977, 1997) social learning and self-efficacy, David Kolb's (1984) experiential learning cycle, Lee Shulman's (1987) concept of pedagogical content knowledge, and Malcolm Knowles' (1984) andragogical principles of adult learning. The model also applied William Spady's (1994) outcomes-based education approach to ensure that all training activities targeted measurable improvements in teacher competence. Instructional materials were enriched with multimedia content, reflective journals, collaborative lesson design tasks, and problem-solving activities, all rooted in real classroom contexts. Once the draft model was complete, it underwent expert validation. Professionals in the fields of education, curriculum design, and teacher development evaluated the training modules for clarity, relevance, content validity, and alignment with adult learning principles. Their suggestions led to improvements such as including more hands-on activities, extending reflective practice, and incorporating localized examples. This stage followed the design-based research principles recommended by Plomp and Nieveen (2007), which emphasize iterative model refinement based on expert and stakeholder feedback.

The revised model was then piloted through field testing with 30 volunteer teachers from various schools in the region. Training was conducted over six weeks using the blended learning structure. Participants engaged in workshops, peer discussions, group teaching simulations, and online learning tasks. To assess impact, the researchers administered pre-tests and post-tests to measure growth in teacher competence. Additional data sources included lesson plans, teaching practice evaluations, and reflective journals. Observations and interviews were also conducted to capture deeper insights into participants' learning experiences. This phase reflected Kirkpatrick's (1994) evaluation framework, focusing on knowledge gains, behavioral change, and participant satisfaction.

Finally, the evaluation phase combined quantitative and qualitative analysis. The paired sample t-test was used to analyze pre-test and post-test results, identifying statistically significant improvements. Qualitative data

were examined through thematic analysis (Braun & Clarke, 2006), which revealed themes such as increased confidence, appreciation for peer learning, and greater relevance of training content. Findings confirmed that the PIKOLAK model effectively supported professional development and aligned with Bandura's (1997) idea that increased self-efficacy fosters sustained improvement in teaching practice. Throughout all stages, ethical principles were carefully observed. All participants gave informed consent, data confidentiality was preserved, and constructive feedback was provided. The research was conducted in close collaboration with the local education authority to ensure cultural and institutional relevance, and followed ethical standards set by BERA (2018) and UNESCO (2016).

By the conclusion of this study, the PIKOLAK model had been fully developed, tested, and validated, with strong evidence supporting its effectiveness in enhancing teacher competence. The next chapter will present the detailed results and implications of the training model's implementation.

IV. RESULT AND DISCUSSION

1. Quantitative Improvements in Teacher Competence

The implementation of the PIKOLAK model resulted in notable gains in the professional competence of participating teachers, as evidenced by the pre- and post-test assessments. Prior to the training, teachers' average score on the competency assessment was 65.2 (on a scale of 0–100). This baseline indicated moderate mastery of the targeted competencies, leaving substantial room for improvement. After completion of the training program, the average score rose to 83.7. This improvement of approximately 18.5 points represents a significant increase in teachers' knowledge and skills. A statistical analysis confirmed that the gain in scores was highly significant ($p < 0.01$), suggesting that the observed improvement was not due to chance. In practical terms, this means that teachers were able to demonstrate a much stronger understanding of effective teaching strategies, pedagogical knowledge, and lesson design principles after undergoing the PIKOLAK training. For example, if the pre-test assessed lesson planning ability or knowledge of student-centered instructional methods, the post-test results showed that many teachers moved from basic or developing levels to proficient levels in these areas. Furthermore, the consistency of improvement across participants was high: nearly all teachers showed an upward trajectory in their scores, with no notable subgroup falling behind. This across-the-board improvement aligns with the Outcomes-

Based Education philosophy of enabling success for all learners and reflects the high expectations set by the program designers. It is also in line with Linda Darling-Hammond's findings that substantial training and preparation can yield significant enhancements in teacher capability, which, in turn, is expected to translate into better classroom outcomes.

2. Qualitative Outcomes and Teacher Feedback

Beyond test scores, qualitative data provided rich insights into how the PIKOLAK model influenced teachers' attitudes, beliefs, and day-to-day practice. Feedback was collected through participant reflection journals, focus group discussions at the end of the training, and classroom observations conducted a few weeks after the training (to see how teachers implemented what they learned). Several key themes emerged, Enhanced Confidence and Self-Efficacy: Teachers overwhelmingly reported a boost in their confidence to try new teaching approaches in the classroom. Many participants noted that before the training they felt unsure about implementing interactive or student-centered methods, but after practicing these methods during the training (and seeing them in action via peer demonstrations), they believed in their ability to use them successfully. For instance, one teacher wrote, "I used to avoid group work in class because I wasn't sure I could manage it well. After collaborating with my colleagues in the training sessions, I tried a small group discussion in my classroom and it went much better than expected." This increase in self-efficacy is a critical outcome; as Bandura's theory suggests, teachers who believe in their capabilities are more likely to persist and innovate in their teaching. The supportive environment of the training – where mistakes were treated as learning opportunities and successes were recognized – contributed to this empowerment of teachers. Stronger Collaborative Practices and Professional Community: Many teachers highlighted that one of the most valuable aspects of the program was the opportunity to work closely with peers. They not only learned new ideas but also developed a sense of camaraderie and mutual support. During focus groups, teachers mentioned that they plan to continue meeting in professional learning communities (PLCs) or informal groups to share lesson plans and observe each other's classes. This indicates that the collaborative culture fostered by PIKOLAK may have lasting effects, seeding ongoing peer-to-peer learning beyond the program itself. Teachers also expressed that hearing about each other's experiences (both challenges and successes in the classroom) was eye-opening and reduced the isolation that teachers sometimes feel. This outcome ties back to Vygotsky's notion of learning as a social, community-oriented process – the training

effectively created a “community of practice” among educators. It also resonates with Knowles’ idea that adults learn from exchanging experiences; in the training, each teacher’s experience became a learning resource for others. Some teachers formed WhatsApp groups or online forums during the blended learning portion, which they reported continuing to use for sharing resources and advice. The establishment of these collaborative channels is a positive sign for the sustainability of the training’s impact.

Improved Instructional Design and Pedagogical Skills: Through observations and teacher self-reports, it was evident that participants developed more sophisticated skills in lesson planning, instructional strategy, and use of educational technology. Observers noted, for example, that teachers’ post-training lesson plans were more detailed and learner-centered compared to their plans before the training. One teacher integrated an interactive simulation (learned from the online module) into a science lesson, something she had never done prior to the training. Others adopted techniques like formative assessment (quick quizzes, exit tickets) and collaborative student activities, which were topics emphasized in the program. Teachers attributed these changes to the integrative nature of the training because PIKOLAK combined theory with hands-on practice; they not only knew what methods were effective but had actually practiced them and received feedback during the training. This reflects the success of the experiential learning design (Kolb’s cycle) in the program: teachers went through concrete experiences in the workshop and were able to translate that into abstract principles and then into active experimentation in their own classrooms. Importantly, teachers also deepened their Pedagogical Content Knowledge. Several participants mentioned that they gained new insights into how to explain difficult concepts in their subject area using creative pedagogical methods shared by colleagues during the training. For instance, a mathematics teacher learned from a peer about using real-life examples and manipulatives to teach algebra, which he found made his teaching more effective and engaging for students. This cross-pollination of content-specific pedagogy aligns with Shulman’s emphasis on sharing and developing pedagogical content knowledge among teachers. The program’s collaborative lesson design tasks effectively served as a vehicle for this kind of PCK development.

Sense of Ownership and Relevance: Teachers appreciated that the PIKOLAK model respected their input and was directly relevant to their needs. In interviews, participants noted that the initial needs analysis was evident in the training content – “It was like the program was tailor-made for the challenges we actually face,” one teacher remarked. Because they had been involved in identifying problems

and because the training activities often revolved around real scenarios from their classrooms, teachers felt a strong sense of ownership over their learning process. This matches Malcolm Knowles’ assertion that adult learners need to understand why they are learning something and prefer to focus on real-world problems. Teachers also valued the flexibility of the blended format; those in remote areas or with family responsibilities were able to engage with online components on their own schedule, which reduced absenteeism and stress. The practical orientation of the tasks (problem-solving, creating something tangible for their class) helped keep motivation high, which correlates with the andragogical principle that adults are internally motivated when learning is relevant to their immediate professional goals. Overall, the participants’ comments suggest that the training was not seen as an imposed requirement, but as a valuable opportunity that they were fully invested in a crucial factor for genuine professional growth.

Challenges and Areas for Improvement: While feedback was predominantly positive, a few challenges were noted, which provide guidance for refining the model. Some teachers initially struggled with the online learning platform due to limited digital skills or unreliable internet connectivity in certain parts of the regency. This indicates a need for including a brief orientation to online learning tools at the start of the program, and possibly integrating more offline alternatives or support for those with connectivity issues. Additionally, a minority of participants felt that the workload was quite intensive – juggling teaching duties with the expectations of the training (especially during the weeks with active online modules) was challenging. This points to the importance of obtaining administrative support (e.g., slightly reduced teaching loads or providing time during school hours for professional learning) when scaling up the program. In terms of content, a few participants expressed interest in even more subject-specific examples and case studies, suggesting that future iterations of PIKOLAK could differentiate more by subject or grade level, or include breakout sessions for specific disciplines to deepen the PCK focus. These suggestions are valuable for enhancement but do not detract from the overall success observed; rather, they represent the normal refinement process for an innovative program.

The results from the pilot implementation of the PIKOLAK training model indicate that it was highly effective in achieving its primary goal of enhancing teachers’ professional competence. The statistically significant jump in competency scores provides quantitative evidence of impact, and the rich qualitative feedback illustrates how and why those gains were

achieved. Teachers not only learned new strategies (knowledge gain) but also embraced them (belief/attitude shift) and started to apply them (behavior change), which is the ultimate aim of any professional development initiative. The multi-theoretical foundation of the model manifested in concrete outcomes: for instance, the social and collaborative structure built a support network (Vygotsky, Bandura), the experiential tasks led to practical classroom changes (Kolb), the focus on content with pedagogy enhanced teaching quality (Shulman), the respect for teachers as learners increased engagement (Knowles), and the outcome focus ensured that improvements were aligned with valued competencies (Spady). These connections are further explored in the discussion section, where we delve into how the theoretical intentions of the model were borne out in practice.

Discussion

The encouraging results of the PIKOLAK model's implementation can be better understood by revisiting the theoretical frameworks that guided its design, confirming that grounding the training in these principles was instrumental to its effectiveness. Here we discuss how each major theoretical element manifested in the outcomes, and we interpret the findings in light of broader literature on teacher professional development.

Social Interaction and Collaborative Learning: The collaborative nature of the training clearly paid dividends, as evidenced by the strong professional community that formed among participants and the continued peer support they reported. This outcome is a direct illustration of Vygotsky's social constructivism in action. By working within what Vygotsky would call each other's Zone of Proximal Development, teachers were able to learn skills with peer assistance that they might not have mastered alone. For example, a teacher who was less confident in using technology in class paired with another who had more experience in that area; through their collaboration, the first teacher acquired new tech-related teaching skills that lay in her ZPD, guided by her peer. This kind of scaffolded learning among equals is a practical fulfilment of Vygotsky's theory that social interaction precedes development here, collaborative learning experiences during PIKOLAK enabled subsequent growth in teaching competence. Moreover, Bandura's social learning theory also helps explain these findings: teachers not only discussed practices but modeled them for each other, observing and imitating effective techniques demonstrated by colleagues. The fact that teachers left the program intending to continue peer observations and co-planning sessions is significant; it shows an internalization of collaborative professional

learning as a norm, which research has shown to be a hallmark of successful schools. Bandura also emphasizes the role of social persuasion and support in building self-efficacy the mutual encouragement and collective celebration of success during the training likely bolstered each teacher's belief in their ability to implement what they learned, as reflected in their newfound confidence. In short, the PIKOLAK model's participatory and collaborative setup created a microcosm of a learning community, validating the idea that teachers, like their students, benefit greatly from not learning in isolation.

Learning by Doing and Reflecting: The integration of experiential learning principles (Kolb) into the PIKOLAK model can be directly linked to the practical improvements teachers made in their instructional practices. Teachers didn't just hear about new methodologies; they tried them out, reflected, and planned further implementation mirroring Kolb's cycle of experience-reflection-conceptualization-experimentation. The success of this approach is evident in teachers' post-training behaviors: many were able to implement complex strategies (like collaborative student projects or new assessment techniques) that they had first practiced in the safe space of the training workshop. This bridge from theory to practice is notoriously difficult to achieve in professional development, and the fact that it occurred suggests the experiential design was crucial. By engaging multiple stages of Kolb's cycle, the training ensured that teachers had processed the new information deeply. For example, when teachers participated in a mock "flipped classroom" exercise during training (a concrete experience), then discussed how it felt and what the challenges were (reflective observation), then generalized principles of when flipping might be useful (abstract conceptualization), and finally went on to flip one of their own lessons in real life (active experimentation), they went full-cycle. Teachers' reflections indicated they appreciated this process one even noted, "I remember each technique well because we did it ourselves, not just listened about it." This aligns with the cognitive science understanding that active learning yields better retention. It also underscores the importance of reflection in teacher learning; as Kolb's theory and other reflective practitioners like Schön have argued, it is the reflection on experiences that solidifies learning. The structured reflection prompts and discussion in the PIKOLAK sessions likely helped teachers articulate and thus remember the lessons learned, which then guided their subsequent classroom actions. Therefore, the data support the notion that experiential learning strategies in PD are effective, adding to existing literature that recommends practice-based training for teachers.

Integration of Content and Pedagogy: The improvements in teachers' lesson planning and pedagogical strategies, particularly within their subject areas, highlight that the PIKOLAK model succeeded in developing teachers' Pedagogical Content Knowledge (PCK). By deliberately designing activities where teachers collaboratively planned lessons or shared teaching approaches for specific content topics, the training ensured that knowledge gained was not just generic pedagogy or generic content, but the intersection of the two. The positive feedback from teachers about learning new ways to teach difficult topics indicates growth in PCK – they not only knew their subject matter, but they learned how to make it accessible and engaging to students, which is exactly what Shulman's concept of PCK encompasses. This is a particularly noteworthy outcome because developing PCK is challenging and often requires experience; what the training did was accelerate that process by letting teachers learn from each other's experiences. A novice teacher hearing how a veteran teaches a topic, and why that method works for students, is essentially being handed hard-won pedagogical content knowledge that they might otherwise gather only after years of trial and error. The collaborative lesson design in PIKOLAK created a platform for this exchange. Consequently, when the teachers returned to their classrooms, they had a toolkit of content-specific strategies to try. This outcome ties to Darling-Hammond's research as well: teacher quality rises significantly when teachers have strong preparation in both content and pedagogy

In this case, the PIKOLAK program functioned almost like a content-focused professional learning community, enhancing the kind of knowledge that makes teaching effective. The results suggest that professional development models should explicitly target PCK (not just general teaching techniques) to achieve significant improvements in teacher performance, supporting Shulman's claim that treating content knowledge and pedagogical knowledge in isolation is insufficient. By bridging that gap, PIKOLAK made the training immediately relevant to classroom practice.

Adult Learning Principles and Teacher Engagement: The high level of teacher engagement and the sense of ownership reported align strongly with Malcolm Knowles' principles of adult learning. The fact that teachers recognized the training as relevant and felt respected in the process is significant because teacher buy-in is often the make-or-break factor in professional development effectiveness. Many reforms fail not due to flawed content but because they ignore adult learning principles, delivering one-size-fits-all lectures to teachers who then feel the training is a waste of time. PIKOLAK's

contrasting success – with teachers even requesting more subject-specific depth and committing to continued collaboration demonstrates the power of adhering to andragogical design. Giving teachers agency (e.g., letting them set some learning goals, choose topics for project work, or identify the challenges to address) likely increased their intrinsic motivation, just as Knowles would predict. The program treated teachers as self-directed learners and acknowledged their prior experience, which in practice was seen when participants were invited to share personal classroom incidents or successful strategies as part of the learning content. This not only validates the teachers' expertise but enriches the learning for the group. Additionally, the problem-centered approach of the training (focusing on real classroom problems to solve) was frequently mentioned in feedback as a highlight teachers found the training immediately useful. According to Knowles, adult learners need to see that what they are learning will help them solve an immediate problem, and indeed PIKOLAK was structured around practical issues like "How to handle a class with mixed ability students" or "How to engage students in active learning". Each session output (like a lesson plan, assessment tool, or classroom management strategy) was something teachers could use the next day in school. This practical payoff is likely a reason for the strong positive reception. Moreover, the blended learning approach respected their need for flexibility: those who had stronger ICT skills or more free time could dive deeper into the online resources, while those with constraints could still participate meaningfully in face-to-face sessions. The success of this approach contributes to the growing evidence that adult learning theory should guide the design of teacher PD: when teachers are treated as adult learners rather than as pupils, the outcomes are far more impactful.

Outcome Focus and Accountability: The competency-based, outcome-oriented nature of PIKOLAK ensured that the training stayed aligned with tangible improvements in teacher performance. William Spady's Outcomes-Based Education framework suggests that clarity about the intended outcomes leads to better alignment of instruction and assessment, which in turn leads to better learning results. In this study, having well-defined teacher competencies as targets meant that every activity had a purpose and the assessments (pre/post-tests) were authentic measures of those competencies. Teachers knew from the outset what the goals were (for example, "By the end of this program, you will be able to incorporate at least two active learning strategies into your teaching of subject X, and use data from formative assessments to adjust your instruction"). This likely helped them focus their efforts and also see their progress more

clearly, contributing to motivation. The significant improvement in test scores attests that the focus on outcomes was met essentially, the program delivered on what it promised, which is the ideal scenario in OBE. Another benefit of the outcome focus is evident in the relatively uniform gains among participants. OBE emphasizes high expectations for all and seeks to minimize the gap between high and low performers by providing support until everyone meets the standard. In the training, facilitators provided extra coaching to those who were struggling (for instance, if a teacher's initial lesson plan had weaknesses, they received one-on-one feedback and chances to improve it). As a result, even teachers who were initially weaker in certain competencies caught up by the end, reflecting the "success for all" ethos. This has important implications for equity – ensuring that every teacher, not just the already motivated ones, improve their practice helps ensure all students have competent teachers. The consistency in outcomes resonates with Darling-Hammond's equity concerns, underscoring that well-designed PD can raise the floor of teaching quality across a system, not just push a few to excellence.

The success of the PIKOLAK model in enhancing teacher competence bodes well for student outcomes in Humbang Hasundutan. Although this study did not directly measure student performance, it is reasonable to anticipate, based on the literature, that students taught by these teachers will benefit from more engaging lessons, better explanations, and more effective assessment and feedback. In the long term, if the PIKOLAK model is institutionalized (for example, adopted by the district or province as a regular in-service training program), it could contribute to systemic improvements. The teachers trained could become local champions or mentors for others, creating a multiplying effect. This connects to Darling-Hammond's emphasis on building professional capacity within the system as a route to lasting reform.

Additionally, the model's adaptability and blended format mean it can be scaled and customized an important factor for sustainability. The discussion with participants suggested that minor tweaks (like more tech support and subject-specific content) would make it even stronger, but fundamentally the model appears robust. It aligns well with global best practices in teacher PD (active learning, collaboration, coaching, sustained duration, focus on content, etc.), meaning it's not only theoretically sound but also practically in agreement with what works in other contexts (as identified by various meta-analyses of PD). In conclusion, the discussion affirms that the PIKOLAK training model's success is closely tied to its foundation in established educational theories. Each element from

Vygotsky's social learning emphasis to Knowles' adult learning principles played a role in shaping a program that teachers found effective and transformative. The coherence between theory and practice in this model can serve as an exemplar for designing future teacher professional development initiatives. By respecting how teachers learn and grow, and by holding clear expectations for outcomes, we can create PD programs that truly empower teachers as PIKOLAK has done to continuously improve their practice for the benefit of their students.

V. CONCLUSION

Empowering teachers through a participatory, integrative, collaborative training model is not only feasible but highly fruitful. As Linda Darling-Hammond's research suggests, investing in building teacher capacity is one of the most impactful strategies for improving education. The PIKOLAK model stands as an evidence-based example of such an investment yielding strong returns. By valuing teachers as professionals who learn and grow much like their students through social interaction, hands-on practice, reflection, and clear goals we can foster a culture of continuous improvement in teaching. Ultimately, the beneficiaries of empowered, competent teachers are the students, who will experience richer, more effective learning in their classrooms. The PIKOLAK initiative thus contributes to the broader goal of educational quality and equity it shows that when teachers are given the opportunity to engage in well-designed professional learning, they can transform their own practices and elevate the learning of the children in their care.

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