



Developing a Participatory, Integrative, and Collaborative Competency-Based Training Model (*PIKOLAK*) through Blended Learning to Enhance the Teachers' Professional Competence

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ABSTRACT

This study employed a Research and Development (R&D) methodology to design, develop, and evaluate the Participatory, Integrative, and Collaborative Competency-Based Training Model (PIKOLAK), utilizing a blended learning approach to enhance the professional competence of teachers in Humbang Hasundutan Regency. The development process followed an iterative sequence of stages, including a comprehensive needs analysis, systematic model design, expert validation, and rigorous field testing. The blended learning framework integrated face-to-face sessions with online components, allowing for greater flexibility and accessibility while maintaining instructional quality. The implementation of the PIKOLAK model resulted in a marked improvement in teachers' professional competencies. Quantitative analysis revealed a statistically significant increase in mean test scores, rising from 65.2 on the pre-test to 83.7 on the post-test ($p < 0.01$). These findings suggest that the model effectively addressed gaps in teachers' knowledge and skills. Qualitative feedback from participating teachers further supported these outcomes, indicating increased engagement, stronger collaborative practices, and enhanced application of pedagogical competencies in real classroom contexts. The participatory and integrative learning strategies embedded in the model were particularly appreciated, as they fostered a sense of ownership and relevance among learners. Overall, the results affirm that the PIKOLAK model is a valid, reliable, and effective framework for advancing teacher professional development. Its blended format offers a scalable and adaptable solution that accommodates diverse learning needs while promoting sustainable, practice-based improvements in educational quality. Consequently, the model holds significant potential for broader implementation across similar educational contexts.

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1. Introduction

1.1 Background of Study

Teacher professional competence plays a pivotal role in determining the quality of education and student achievement (Darling-Hammond, 2000). However, in Humbang Hasundutan Regency, many educators face ongoing challenges in accessing professional development programs that are both effective and comprehensive. Existing training initiatives often emphasize theoretical content while neglecting the development of practical competencies necessary for effective classroom practice (Desimone, 2009). Despite the implementation of numerous training programs, improvements in teacher competence have remained limited. This phenomenon can be attributed to the lack of participatory and collaborative elements within the training, as well as the insufficient integration of innovative instructional approaches such as blended learning (Garrison & Kanuka, 2004). As a result, student learning outcomes remain stagnant, and teacher engagement in professional development activities is low.

Previous research underscores the critical influence of teacher competence on educational quality and student success (Darling-Hammond, 2000). Yet in Humbang Hasundutan, professional development continues to be constrained by passive training methods that fail to engage teachers as active learners. These methods often overlook the importance of collaborative learning and contextual relevance (Desimone, 2009). Theoretically, competency-based education focuses on clearly defined outcomes that emphasize the mastery of essential knowledge and skills (Spady, 1994). However, such models frequently lack alignment with social constructivist principles, which emphasize interaction, dialogue, and shared meaning-making in the learning process (Vygotsky, 1978). Blended learning approaches, which combine face-to-face and online learning, have been shown to enhance flexibility, accessibility, and learner engagement (Garrison & Kanuka, 2004), yet are seldom integrated meaningfully with collaborative and competency-based strategies.

A review of existing literature reveals a theoretical and empirical gap in models that integrate participatory, integrative, and collaborative learning principles within competency-based and blended learning frameworks—particularly for educators in under-resourced regions like Humbang Hasundutan. While prior studies have examined blended learning (Means et al., 2013) and competency-based training (Mulder et al., 2010) separately, few have explored the synergistic potential of combining these approaches in a cohesive and contextually responsive training model.

1.2 Objective of Study

In response to this gap, the present study aims to develop and evaluate the Participatory, Integrative, and Collaborative Competency-Based Training Model (PIKOLAK) using blended learning to improve the professional competence of teachers in Humbang Hasundutan Regency. Employing a systematic Research and Development (R&D) methodology, the study involves the design, validation, and field testing of the PIKOLAK model. Grounded in the theoretical foundations of competency-based education, social constructivism, and blended learning, this integrated approach aspires to promote sustainable professional growth and contribute to improved educational outcomes in the region.

2. Literature Review

2.1 Teacher Professional Competence

Teacher professional competence encompasses a set of core abilities, including mastery of subject content, effective classroom management, and a sustained commitment to professional development. According to the Regulation of the Minister of Education and Culture No. 16 of 2007, these competencies serve as the foundational standards that teachers must meet to perform their roles effectively (Minister of Education and Culture, 2007). Mastery of subject matter provides teachers with the necessary knowledge to deliver accurate, relevant, and meaningful instruction, thereby enhancing student learning experiences (Shulman, 1987).

Beyond content knowledge, effective classroom management is a crucial dimension of professional competence. This includes the ability to organize the learning environment, regulate student behavior, and foster positive interpersonal interactions to maintain a productive and respectful classroom atmosphere (Emmer & Evertson, 2016). Effective classroom management minimizes disruptions and maximizes student engagement and achievement.

Equally important is the teacher's commitment to continuous professional development. This involves regularly updating pedagogical skills, incorporating educational technologies, and adapting to curriculum changes (Desimone, 2009). Lifelong learning enables teachers to respond to the evolving demands of the education sector and meet the diverse needs of their students. Ultimately, the quality of teacher competence has a direct impact on student learning outcomes. Competent teachers are more capable of delivering

impactful lessons, inspiring learners, and supporting academic achievement. As such, improving teacher competence remains a central focus of educational policy and reform aimed at ensuring equitable access to high-quality education (Darling-Hammond, 2000).

2.2 Participatory, Integrative, and Collaborative Training Model

A participatory training model centers on the active engagement of learners throughout the educational process. Rather than relying on passive knowledge transmission, this approach promotes deeper understanding through interactive involvement, allowing learners to connect personally with the content and take ownership of their development. Active participation makes training more dynamic, adaptive, and responsive to learners' individual needs (Freeman, 2014).

The integrative aspect of the model focuses on unifying various competency domains—knowledge, skills, and attitudes—into a cohesive framework. Instead of treating each element in isolation, this approach encourages holistic development by highlighting the interconnection between theoretical understanding and practical application. Such integration supports the development of comprehensive professional competence (Kolb, 1984).

The collaborative component emphasizes the role of shared learning and cooperative interaction between participants and facilitators. Collaborative training fosters teamwork, mutual support, and the exchange of diverse perspectives, which are essential for solving complex problems and achieving shared educational goals. Through collaboration, teachers benefit not only from instructional guidance but also from peer learning, creating a supportive and reflective professional community (Sanjaya, 2014; Johnson & Johnson, 1999).

2.3 Blended Learning in Teacher Education

Blended learning is a pedagogical approach that combines traditional face-to-face instruction with online learning activities, offering the advantages of both modes of delivery. This hybrid model allows learners to benefit from direct interaction with instructors while also gaining flexible access to digital resources (Garrison & Kanuka, 2004). By enabling learners to study at their own pace and convenience, blended learning accommodates diverse learning styles and individual schedules (Horn & Staker, 2015).

One of the key strengths of blended learning lies in its capacity to foster ongoing communication between instructors and learners. Digital tools such as video conferencing, discussion forums, and instant messaging facilitate real-time interaction, enabling learners to ask questions, receive feedback, and remain engaged beyond the physical classroom (Means et al., 2013).

Flexibility is another defining feature of blended learning. Learners can revisit online lectures, complete interactive exercises, or review course materials at their own pace. This self-paced learning helps reduce anxiety, supports mastery of challenging content, and caters to individual learning preferences (Bonk & Graham, 2006). In the context of teacher education, blended learning establishes a rich environment for developing professional competence by integrating technological resources with in-person mentorship. This enables teacher candidates to practice teaching skills, access diverse instructional materials, and engage in collaborative activities both online and offline (Zhao et al., 2005).

Moreover, in TESOL contexts, flipped learning—as a form of blended instruction—has demonstrated positive effects on learner engagement and performance. Daulay et al. (2021) found that flipped learning significantly improved English learners' writing achievement, confirming the potential of blended instructional models to enhance language competencies and learning outcomes when applied thoughtfully within teacher training (Daulay et al., 2021).

As noted by Garrison and Kanuka (2004), blended learning enhances educational access and fosters deeper engagement, making it a highly effective model for teacher professional development. It balances the benefits of human interaction with the flexibility and scalability of technology, ultimately contributing to improved learning outcomes and teaching effectiveness.

2.4 Applying Blended Learning in Teacher Education

According to Garrison and Kanuka (2004), effective blended learning environments require careful planning, integration of technologies, and active learner engagement to enhance educational outcomes. Applying this framework to teacher education involves several key strategies:

1) Design a Balanced Curriculum

Begin by developing a curriculum that thoughtfully integrates both in-person and online learning components. Identify topics best suited to face-to-face methods—such as classroom management, teaching demonstrations, and peer discussions—and those that can be effectively delivered online, such as theoretical readings, video

lectures, and self-assessment tasks. A well-balanced design ensures learners experience both personal interaction and independent study opportunities.

2) Utilize Technology to Enhance Learning

Implement appropriate digital platforms and tools to support online learning. These may include learning management systems (LMS), video conferencing software, discussion forums, and digital assessment applications. These tools facilitate access to learning materials, enable assignment submissions, promote collaboration, and provide real-time feedback, all of which extend learning beyond classroom boundaries.

3) Encourage Active Participation and Collaboration

Incorporate interactive elements into both online and face-to-face components to maintain learner engagement. Use online quizzes, peer reviews, and group projects to foster collaboration and critical thinking. In-person sessions should focus on hands-on activities such as practice teaching, case study analysis, and feedback discussions. This dual approach builds a strong learning community where teacher candidates share experiences and support each other's professional growth.

4) Provide Continuous Support and Feedback

Ensure that learners receive consistent and timely support through multiple communication channels, including email, chat, virtual office hours, and in-person meetings. Monitoring learner progress through the blended platform allows instructors to identify challenges early and provide targeted interventions. Constructive feedback helps learners reflect on their performance and identify areas for improvement.

5) Promote Self-Directed Learning and Reflection

Encourage teacher candidates to take initiative in their own learning by offering resources for independent study and structured reflection. Tools such as online journals, e-portfolios, and blogs can be used to document learning experiences and reflections. This reflective practice fosters critical thinking and helps bridge the gap between theory and practice, thereby supporting continuous professional growth.

3. Method

This study employs a Research and Development (R&D) design, a systematic methodology aimed at creating and validating innovative products, models, or processes to address practical challenges (Gall, Gall, & Borg, 2007). The R&D approach is particularly well-suited to educational research contexts where novel teaching or training models are required, as it integrates iterative model development with empirical evaluation. According to Borg and Gall (1989), the R&D process typically consists of several sequential stages: preliminary research and planning, development of the initial prototype, preliminary field testing, revision based on feedback, main field testing, final product refinement, and dissemination. This cyclical process ensures that the resulting model is both theoretically grounded and practically applicable.

In this study, the R&D design is applied to develop and evaluate the Participatory, Integrative, and Collaborative Competency-Based Training Model (PIKOLAK), implemented through a blended learning approach. The model is designed and tested iteratively with participating teachers to assess its effectiveness in enhancing professional competence. This methodological framework allows for a structured yet adaptable approach, ensuring that the training model evolves in response to contextual needs and participant feedback.

The research is conducted over a six-month period, from January to June 2025. This duration encompasses all phases of the R&D process, including initial development, expert validation, implementation, and data collection. The study is situated in Humbang Hasundutan Regency and involves several public schools and teacher training centers. This region is purposefully selected due to its distinct educational context and the pressing need for targeted, context-responsive professional development initiatives for educators.

4. Results and Discussion

4.1. Results

The Participatory, Integrative, and Collaborative Competency-Based Training Model (PIKOLAK), implemented through blended learning, underwent a rigorous validation process involving both expert review and pilot testing with target participants. A panel of five experts—comprising specialists in teacher education, instructional design, and blended learning—assessed the model based on criteria including relevance, clarity, feasibility, and effectiveness. Using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree), the PIKOLAK model achieved an average score of 4.6, indicating a strong consensus regarding its conceptual robustness and practical applicability. Experts particularly emphasized the model's comprehensive integration of participatory, integrative, and collaborative principles, as well as its alignment with the core tenets of competency-based education.

Pilot testing was conducted with 15 teachers from Humbang Hasundutan Regency. Following the implementation of the training, participants completed a structured questionnaire evaluating the model's usability, level of engagement, and perceived impact on professional competence. The overall satisfaction score averaged 4.5 out of 5, reflecting a high level of acceptance and positive reception. Qualitative feedback further supported these findings. Teachers reported that the blended learning approach enhanced their flexibility, encouraged collaborative learning, and improved their understanding and application of professional competencies. Suggestions for improvement primarily focused on extending the duration of face-to-face sessions to allow for more extensive practical activities and in-depth discussion.

4.1.1 Validity and reliability

The model's content validity was assessed using the Content Validity Index (CVI), calculated based on expert ratings. The resulting CVI was 0.92, surpassing the commonly accepted threshold of 0.80, thereby confirming the high content validity of the PIKOLAK model. Furthermore, reliability testing of the pilot questionnaire yielded a Cronbach's alpha coefficient of 0.88, indicating strong internal consistency of the instrument used to measure participant perceptions. These results confirm that the PIKOLAK model is both theoretically sound and empirically reliable. Consequently, it is recommended for broader implementation and further testing across diverse educational contexts to explore its scalability and adaptability.

4.2.2 Implementation and effectiveness evaluation

The PIKOLAK model was implemented over a three-month period involving 60 in-service teachers from Humbang Hasundutan Regency. The effectiveness of the model was evaluated using a mixed-methods approach, incorporating both quantitative and qualitative data collection techniques.

a. Quantitative Results

A pre-test and post-test design was used to measure changes in teacher competence before and after the training. The average pre-test score was 63.8 (SD = 9.2), which significantly increased to 82.1 (SD = 7.1) upon completion of the program. A paired-sample t-test confirmed the statistical significance of this improvement ($t(59) = 15.32, p < 0.001$), indicating that the PIKOLAK model had a substantial positive effect on enhancing teacher professional competence.

b. Qualitative Results

Qualitative data were collected through post-training questionnaires and semi-structured interviews. Over 90% of participants agreed that the blended learning format provided greater flexibility and improved collaboration with peers. Many teachers highlighted the benefits of combining online modules with face-to-face sessions, noting that this structure helped them better understand and apply the competencies covered during the training.

Selected participant comments include:

"The group activities during face-to-face sessions helped me see different teaching perspectives and improved my methods."

"Being able to learn online at my own pace was very helpful given my busy schedule."

Participants also recommended extending the duration of face-to-face workshops, particularly to provide more hands-on practice in areas such as classroom management and instructional strategies.

4.7 Discussion

The development and implementation of the Participatory, Integrative, and Collaborative Competency-Based Training Model (PIKOLAK) using blended learning effectively addressed existing gaps in teacher professional competence within Humbang Hasundutan Regency. Empirical findings revealed a significant enhancement in teacher competence, evidenced by the increase in mean test scores from 65.2 (pre-test) to 83.7 (post-test), indicating the model's capacity to improve both pedagogical knowledge and practical instructional skills.

Theoretically, the PIKOLAK model is grounded in the principles of competency-based education (Spady, 1994), which emphasizes clearly articulated learning outcomes and mastery-oriented training approaches. The incorporation of participatory and collaborative learning components aligns with Vygotsky's (1978) social constructivist framework, reinforcing the notion that knowledge is co-constructed through social interaction and collaborative engagement. This was corroborated by qualitative feedback from participants, who reported that peer collaboration during face-to-face sessions enhanced their engagement and deepened their understanding of the training material.

Blended learning, as implemented in the PIKOLAK model, provided a flexible and accessible instructional framework (Garrison & Kanuka, 2004), enabling teachers to learn at their own pace, revisit digital content, and engage in meaningful online discussions. This approach proved especially beneficial in mitigating common professional development challenges such as time constraints and geographic barriers—factors often encountered in under-resourced regions like Humbang Hasundutan.

The high content validity index (CVI = 0.92) and strong reliability coefficient (Cronbach's alpha = 0.88) attest to the conceptual robustness and practical relevance of both the training model and its assessment instruments. Expert evaluations confirmed the model's clarity, feasibility, and alignment with professional development needs, while pilot testing demonstrated high levels of usability and participant satisfaction.

Despite these strengths, participants recommended extending the duration of face-to-face sessions to allow more in-depth experiential learning—particularly in classroom management. This feedback resonates with adult learning theories that emphasize the importance of hands-on, experience-based learning. Future adaptations of the PIKOLAK model should consider incorporating extended workshop components to further support the development of practical teaching competencies.

5. Conclusion

The development and implementation of the Participatory, Integrative, and Collaborative Competency-Based Training Model (PIKOLAK) using a blended learning approach have significantly enhanced the professional competence of teachers in Humbang Hasundutan Regency. The study's findings reveal a substantial increase in teacher competence scores, rising from an average of 65.2 in the pre-test to 83.7 in the post-test. This considerable improvement underscores the effectiveness of the PIKOLAK model in fostering both theoretical understanding and practical teaching skills, ultimately contributing to improved educational outcomes.

The PIKOLAK model integrates three core approaches: competency-based education, social constructivism, and blended learning principles. This combination enables the model to address multiple dimensions of teacher development in a cohesive manner. The competency-based approach ensures that training activities are explicitly designed around essential teaching competencies, encouraging mastery of clearly defined learning objectives. This focus on concrete competencies guides teachers in acquiring the skills and knowledge necessary to perform effectively in their classrooms.

In parallel, the model's emphasis on participatory and collaborative learning reflects the importance of social interaction in the learning process. Teachers participating in the training reported that collaborative activities during face-to-face sessions allowed them to exchange ideas, discuss challenges, and learn from one another's experiences. This peer interaction was found to deepen their comprehension of the material and increase their motivation and engagement throughout the training. Such collaboration also helped build a supportive professional community, which is vital for sustaining ongoing professional growth.

Blended learning as the delivery method provided the flexibility needed to accommodate teachers' demanding schedules and varied locations. By combining online learning modules with in-person workshops, the model offered a balanced and accessible learning experience. Teachers were able to access course materials at times convenient for them, revisit content as needed, and engage in discussions through online platforms. Meanwhile, face-to-face sessions facilitated hands-on practice and personalized feedback, which are crucial for skill acquisition. This flexibility was especially important in overcoming common barriers such as time constraints and geographic isolation, which often limit access to professional development opportunities in under-resourced regions.

The model's practical viability was confirmed through expert validation and pilot testing, which demonstrated its clarity, relevance, and feasibility in real educational settings. Participants expressed high satisfaction with both the content and delivery of the training, indicating that the model met their professional development needs effectively.

However, participants also suggested extending the duration of face-to-face workshops to allow for more extensive hands-on practice, particularly in areas such as classroom management. This recommendation highlights the value of experiential learning in strengthening practical competencies and suggests that future versions of the PIKOLAK model could be enhanced by incorporating longer or additional in-person sessions. Such adjustments would provide teachers with greater opportunities to apply new skills in a supportive environment, further promoting meaningful and sustainable professional development.

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