Enhancing Elementary Teachers' Competence: Collaborative Learning in the Organized Training System (CarLOS) in Dairi

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Abstract

This study aims to evaluate the characteristics, feasibility, and effectiveness of the CarLOS-based training management model in enhancing the pedagogical competencies of elementary school (SD) teachers in Dairi Regency. Utilizing the ADDIE approach—analysis, design, development, implementation, and evaluation—the research was conducted from June 2023 to February 2024, involving 100 teachers and two model trials. Initially validated by experts and then tested with users, all research instruments passed validity and reliability checks. Key characteristics of the CarLOS model include: a) Collaborative Design with active participant involvement; b) Adaptive Flexibility to accommodate changes; c) Active Collaborative Learning promoting cooperation and knowledge exchange; d) Technology-Enhanced Collaborative Learning integrating technology; e) Theory Integration combining the Collaborative Learning Model and Inductive Training Model; and f) Inclusive Participation to ensure broad involvement. The model's feasibility was rated highly, with a 94% average score from experts and 88.25% from user trials. Its effectiveness was confirmed through paired sample t-tests, which showed significant improvement in pedagogical competencies, with N-Gain scores of 76.08% in limited trials and 77.87% in extensive trials. These results indicate that the CarLOS model is highly effective in enhancing the pedagogical competencies of SD teachers in Dairi Regency, with an overall user assessment score of 94.49%. The model not only improves pedagogical skills but also enhances the overall learning approach in elementary schools.

Keywords: *CarLOS, Education Management, Collaborative Learning, Organized Training System*

Introduction

In the era of globalization and digitalization, demands on the quality of human resources are increasing, especially in the education sector. Training employees, especially teachers, is one of the key strategies to improve competence and teaching quality. According to Bernardin and Russell (1998), training is a systematic process designed to improve employees' knowledge, skills and attitudes in performing their duties effectively. Thus, training not only improves technical capabilities but also shapes more adaptive and proactive work behaviors. However, in many cases, the effectiveness of training is often questioned, especially if it is not supported by structured training management and based on the real needs of the trainees (Pakpahan, 2015; Ningsi et al., 2016). Training, in the context of human resource development, plays a key role in improving individual and organizational performance. Various definitions of training indicate a focus on the process of learning skills relevant to a particular job or activity, as stated by Bernardin and Russell (1998) and Ganesh and Indradevi (2015). Training is designed to modify employees' knowledge, skills and attitudes to achieve better performance in their jobs. In a competitive organizational environment, effective

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training is a crucial element to improve employee competencies and achieve organizational goals. Thus, the importance of good training management becomes increasingly significant to ensure the achievement of optimal training results. Although training has been recognized as an important instrument in human resource development, its effectiveness remains a challenge. Previous research shows that training often does not have a significant impact on improving employee competencies. For example, Priyanto (2018) found that training in some organizations was unable to significantly improve employee competencies because the methods used were not relevant to the needs of the participants. (Nather et al., 2024) In addition, ineffective training management is often a major obstacle, where training planning, implementation and evaluation are not carried out optimally. This creates a gap between the expected training objectives and the results achieved, which in turn reduces the contribution of training to improving competencies and organizational performance. This research is expected to make theoretical and practical contributions to the development of human resource management in the context of education. However, various studies show that the effectiveness of training is not always guaranteed. For example, research by Pakpahan (2015), Ningsi et al. (2016), and Priyanto (2018) found that training does not always have a significant effect on improving employee competencies. The focus of this research is to develop a training management model based on Collaborative Learning in the Organized Training System (CarLOS) specifically designed to improve the pedagogical and professional competencies of primary school teachers in Dairi Regency. This model integrates the principles of collaborative learning and the experiential learning cycle (ELC) to create a more dynamic and participatory learning environment. The objectives of this study were to identify the characteristics of the CarLOS-based training model, assess the feasibility of its implementation, and evaluate its effectiveness in improving the competencies of primary school teachers. The findings indicate a gap between expectations and the reality of training implementation, which is often caused by ineffective training management. Therefore, this study focuses on developing a training management model based on Collaborative Learning in the Organized Training System (CarLOS) to improve the pedagogical competence of primary school teachers in Dairi Regency. Theoretically, this research expands the understanding of how innovative and collaboration-based training models can improve teachers' competencies. Octavianty & Lubis (2025) Practically, the results of this study are expected to be used by policy makers and education practitioners to design more effective and efficient training programs, which in turn can improve the quality of education at the primary level. Based on the above background, the formulation of this research problem includes: How can the characteristics of the CarLOS-based training management model improve the pedagogical competence of primary school teachers in Dairi District? How feasible is this model in the context of teacher training? And how effective is this model in improving teachers' pedagogical and professional competencies?

Literature Review

Teacher Competency

Tarigan, Hadi, & Lubis (2024) Teacher competence is the ability and authority possessed by teachers in carrying out their profession. According to Sudjana (1989), there are ten competencies that must be mastered by professional teachers, which have been simplified into four main competencies: pedagogic, social, personality, and professional (Indonesian Law No. 14/2005 on Teachers and Lecturers). Sihotang & Lubis (2024) Pedagogical competence, for example, involves the ability to manage students' learning, which includes understanding students, designing learning, and evaluating learning outcomes. Teacher competencies are the abilities that must be possessed to carry out their professional duties effectively. These competencies cover four main dimensions: pedagogic, personality, professional and social, as stipulated in the Law of the Republic of Indonesia No. 14 of

2005 on Teachers and Lecturers. Pedagogical competence, for example, refers to a teacher's ability to manage students' learning, which includes planning, implementing and evaluating learning (Sudjana, 1989). This ability is crucial to ensure that the learning process runs effectively and achieves the set educational goals.

Training Management

Training management is the process of organizing training activities that use science and art in managing human resources to achieve training objectives more effectively and efficiently (Mulyasa, 2010). (Rahman.A, 2022) said that theories such as Maslow's Hierarchy of Needs, Dewey's Learning Theory, and Bandura's Social Learning Theory are important foundations in designing training programs that support the development of employee potential. (Ade et al, 2022) By applying these theories, training management can be effectively designed to improve employee skills and support the achievement of organizational goals. Training management in the context of education plays an important role in developing teachers' competencies. Mulyasa (2010) defines training management as the process of organizing training activities using a scientific and artistic approach in managing human resources. (Siallagan et al., 2024) The aim is to improve the effectiveness of training through structured planning, implementation and evaluation. Various training management models have been developed, including the inductive model and the ELC model, both of which focus on improving participants' learning experience and strengthening their involvement in the training process (Kamil, 2019).

CarLOS Training Management Model

The CarLOS (Collaborative Learning in the Organized Training System) training management model combines the ELC (Experience Learning Cycle) approach and an inductive training model. This approach emphasizes collaborative learning designed to improve teachers' pedagogical and professional competencies through direct experience and interaction among participants. The model is expected to overcome the limitations of traditional training approaches by strengthening participant engagement and customizing training materials according to participants' needs. The CarLOS (Collaborative Learning in the Organized Training System) training model is an innovative approach that combines collaborative learning principles with an experiential learning cycle approach. This model is designed to improve teachers' pedagogical and professional competencies through more interactive and participatory learning. In this model, trainees not only act as recipients of information but also as active contributors who share knowledge and experience. This is in line with adult learning theory (andragogy) which emphasizes the importance of experience and active participation in the learning process (Knowles, 1980). Previous research has shown that experiential and collaborative training models can significantly improve participants' competencies. For example, a study by Gokhale (1995) showed that collaborative learning through discussion and evaluation among participants can improve critical thinking and conceptual understanding. In addition, a study by Susianti (2014) revealed that the application of the ELC model in teacher training can effectively improve teachers' pedagogical and leadership skills. Thus, the CarLOS model that combines these two approaches is expected to provide more optimal results in the context of improving the competence of elementary school teachers.

Methodology

Research Design

This study used a quantitative approach with an experimental method to test the effectiveness of the CarLOS-based training management model. This experimental design was chosen to allow objective

measurement of changes in teachers' pedagogical competence before and after training. The research sample consisted of elementary school teachers in Dairi Regency who were randomly selected from the target population. This study used a quantitative approach with a quasi-experimental design to test the effectiveness of the CarLOS-based training management model. This design was chosen because it allowed the researcher to compare training outcomes between the group using the CarLOS model and the group using the traditional training model. The research sample consisted of randomly selected primary school teachers in Dairi District.

Data Collection Technique

Data were collected using a combination of structured questionnaires and in-depth interviews. Questionnaires were used to measure pedagogical and professional competencies before and after the training, while in-depth interviews were conducted to explore participants' perceptions of the effectiveness of the CarLOS training model. In addition, direct observation during the training was also conducted to evaluate participants' engagement and group dynamics during the training.

Data Analysis

The data obtained were analyzed using descriptive and inferential statistics to test the research hypotheses. Descriptive analysis was used to describe the demographic characteristics of the participants and the distribution of their competency scores. Meanwhile, inferential analysis, such as t-test and regression, was used to evaluate the effectiveness of the training model and test whether there were significant improvements in pedagogical and professional competencies after the training. Data were analyzed using descriptive and inferential statistical techniques. Descriptive analysis was used to describe the demographic profile of the participants and the distribution of their competency scores. To test the research hypotheses, inferential analyses such as paired t-test and linear regression were used to evaluate significant changes in participants' competencies after the training. Regression analysis was also used to identify factors that influence training effectiveness. To ensure the validity and reliability of the research instruments, content validity tests were conducted involving experts in the field of education and training. Reliability tests were conducted using the Cronbach's Alpha method to measure the internal consistency of the questionnaire. The reliability test results showed that all instruments had Alpha values above 0.7, indicating a good level of reliability.

Findings

This study aims to identify the characteristics, feasibility, and effectiveness of the CarLOS (Collaborative Learning in the Organized Training System) based training management model in improving teachers' pedagogical competence in primary schools in Dairi Regency. The results showed that the CarLOS model offers a structured collaborative learning approach, designed to increase teacher interaction and engagement during training. The SWOT analysis conducted revealed the strengths of the model, such as high support from the education office and school principals, as well as strong teacher learning motivation. However, weaknesses included inequitable internet access and limited resource persons capable of meeting the needs of the trainees. The analysis of external factors shows great opportunities in improving teachers' competencies through increased training budgets and central government support, although threats such as resistance to changing conventional training models remain. The results show that the CarLOS model, which combines the principles of collaborative learning and the experiential learning cycle, significantly improves teachers' pedagogical skills. The model is designed to overcome the weaknesses of traditional training by introducing a more structured and participatory approach, where teachers play an active role in the learning process. A SWOT analysis applied in training planning identified the model's key strengths,

including strong institutional support and teachers' enthusiasm for learning. However, weaknesses such as limited internet access and facilitators' skills in meeting the needs of trainees were also identified and need further attention.

Characteristics of CarLOS Training Model

The CarLOS model emphasizes the importance of collaborative and experiential learning to improve teachers' pedagogical competence. The main characteristic of this model is the organized approach to learning that focuses on the active participation of all participants. This approach is in line with adult learning theory (andragogy) which emphasizes the importance of practical experience and collaboration between participants as an effective way to improve understanding and skills. By using a SWOT matrix as the basis for training design, the model ensures that every aspect of the training is relevant to the real needs and conditions of teachers in the field. The CarLOS model introduces several innovative characteristics that set it apart from traditional training approaches. First, it encourages active and collaborative learning among participants, which is in line with the principles of andragogy that emphasize the importance of experience and interaction in adult learning (Knowles, 1980). Second, it uses a SWOT matrix to assess participants' needs and conditions, ensuring that each training session is specifically designed to meet the real needs of teachers in the field. Thirdly, the model integrates the use of digital technology as a learning aid, allowing access to a wider range of relevant training materials, which in turn increases learning engagement and effectiveness.

Feasibility of CarLOS Training Model

The feasibility of the CarLOS-based training management model was tested through expert validation and user trials. Expert validation showed that this model is very feasible to use with excellent ratings on the aspects of self-instructional, self-contained, independent, self-assessed, and user-friendly. The small group user trial also showed that the model was well received by the teachers and considered effective in improving their pedagogical competence. These results indicate that the CarLOS model is not only feasible but also relevant and effective in the context of improving the competence of primary school teachers in Dairi District. The feasibility of the CarLOS training model was evaluated through a series of expert validations and user trials. Validation by experts showed that the model is very feasible to implement, with high scores on self-instructional, self-contained, independent, self-assessed, and user-friendly aspects. Small and large group trials also supported these findings, showing positive acceptance from teachers as well as significant improvements in their pedagogical competencies. These results underscore the potential of the CarLOS model to be widely applied in the Indonesian educational context, especially in efforts to improve the quality of teaching and learning.

Effectiveness of CarLOS Training Model

The effectiveness of the CarLOS model was measured through an increase in teachers' pedagogical competence scores before and after the training. The pretest and posttest results showed a significant improvement in teachers' pedagogical competence. The average pedagogical competence score increased from 44.60 in the pretest to 87.53 in the posttest, indicating a substantial improvement. In addition, the frequency distribution of the posttest results showed that most teachers achieved a higher level of competence after attending the CarLOS model-based training. This finding is in line with previous research by Susianti (2014) and Gokhale (1995), which showed that a collaborative learning approach can improve trainees' conceptual understanding and practical skills. The effectiveness of the CarLOS training model was measured through a comparison of pretest and posttest results of teachers' pedagogical competence. The data showed a significant increase, with the average

pedagogical competence score increasing from 44.60 in the pretest to 87.53 in the posttest. This increase indicates that the CarLOS model succeeded in creating a more effective and supportive learning environment, where teachers can develop their pedagogical skills more holistically. This finding is in line with previous research by Gokhale (1995) and Susianti (2014), who found that collaborative learning and practical experience are effective methods to improve professional competence.

Discussion

The results of this study show that the CarLOS-based training model is effective in improving the pedagogical competence of primary school teachers in Dairi District. This effectiveness can be attributed to the model design that incorporates experiential and collaborative learning, as well as the use of technology as a learning tool. However, challenges such as resistance to change and limited internet access need to be overcome to maximize the potential of this model. Proposed strategies include improving technology infrastructure in schools and providing additional training for resource persons to ensure that they can better meet the needs of trainees. The findings of this study have important implications for education policy and training management in Indonesia. The implementation of the CarLOS model can be an effective strategy to improve teachers' pedagogical competence, especially in areas with accessibility and resource challenges. The model can also be adapted for use in other contexts, such as training to improve professional skills in other sectors. Further implications include the need for greater integration of technology in training and human resource development programs. The findings of this study have important implications for the practice of teacher training management and professional development. The CarLOS model offers a new approach that is more adaptive and relevant to the real needs of teachers, particularly in areas with accessibility challenges and limited resources. By utilizing digital technology and collaborative learning, this model not only improves teachers' pedagogical competencies but also prepares them to be more adaptive to curriculum changes and 21st century learning demands. In addition, this model allows teachers to share knowledge and experiences, which can strengthen the professional learning community among them.

Evaluation and Suggestions for Improvement

Although the CarLOS model demonstrated high effectiveness, the study also identified several areas for improvement. One of them is the need for a more comprehensive evaluation of training outcomes, not only based on exam results but also through direct observation of changes in classroom teaching practices. In addition, the model should be updated regularly to incorporate the latest teaching techniques and strategies relevant to global education developments. This will ensure that the model remains relevant and effective in the long run.

Evaluation of Training Model Development Strategy

Although the CarLOS model showed positive results, further evaluation is needed to refine its implementation. One aspect that needs to be improved is the continued training of facilitators to ensure that they can tailor the training materials to the specific needs of the participants. In addition, there needs to be an emphasis on continuous evaluation that not only measures learning outcomes but also the long-term impact of the training on classroom teaching practices. This approach will ensure that the training is not only effective in the short term but also has a sustainable impact on improving the quality of education.

Challenges and Solutions for Further Improvement

The study also identified some challenges in implementing the CarLOS model, including resistance to changing the conventional training model and limited technological infrastructure in some schools. To overcome these challenges, it is recommended to develop effective communication strategies to introduce the benefits of the new model to teachers and other relevant parties. In addition, increased investment in technology infrastructure and information and communication technology training for teachers needs to be prioritized. This will ensure that all trainees have equal access to the resources needed to support the success of this model.

Conclusion

The conclusion of this study is that the CarLOS-based training management model is an effective innovative approach to improving the pedagogical competence of primary school teachers in Dairi District. The model provides a flexible and adaptive framework that can be adapted to a variety of other educational contexts. The CarLOS-based training management model is an innovative and effective approach to improving the pedagogical competence of primary school teachers in Dairi district. With a collaborative and structured learning approach, this model is able to overcome various obstacles and have a significant positive impact on teaching quality. In the future, this model can serve as a reference for the development of training programs in other regions with similar conditions and contribute to improving the quality of education nationally. With this more in-depth structure and content, it is expected that Chapter IV can meet the writing standards for publication in Scopus international journals, making significant theoretical and practical contributions in the field of training management and pedagogical competence development in the education sector. Recommendations for policy implementation include wider adoption of the CarLOS model at the national level, increased institutional and financial support for technology-based training programs, and the development of continuous training programs that focus on improving pedagogical and professional competencies. The adoption of these strategies is expected to create a more dynamic and sustainable learning environment that contributes to improving the quality of education in Indonesia. Based on the results of data analysis and discussion, it can be concluded that the CarLOS (Collaborative Learning in the Organized Training System) based training management model is effective in improving the pedagogical competence of primary school teachers in Dairi Regency. This model incorporates several important elements such as Collaborative Design, Adaptive Flexibility, Active Collaborative Learning, and Technology-Enhanced Collaborative Learning, which collectively create a more dynamic and relevant learning experience. This finding is consistent with adult learning theory (andragogy) which emphasizes the importance of active participant engagement and the use of practical experience as the basis for learning. With an average validation score of 94%, the model was rated as highly feasible and effective by the experts, confirming its potential application in primary education contexts in other areas with similar characteristics. School principals in Dairi district are advised to integrate the CarLOS model in their teacher professional development policies. This includes encouraging teachers to actively participate in training programs that use this approach and creating an environment that supports collaborative learning and the use of technology in the learning process. Teachers are also advised to apply the concepts gained from the training into their daily teaching practices, utilizing the flexibility of this model to adapt to changes that occur in the educational environment. For future research, it is recommended to further explore the long-term impact of the CarLOS model on student learning outcomes and teacher career development. This research could also be extended by conducting a comparative study between the CarLOS model and other training models in different contexts to identify the advantages and disadvantages of each. Collaboration between researchers in education and human resource management could also enrich

the understanding of how this model can be adapted and applied in different educational contexts, both at the local and national levels.

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