

# Deep Learning Implementation and Teacher Readiness: A Correlational Study of Training Participation

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e-mail: <sup>1</sup>[yuniarta.syaumi@unej.ac.id](mailto:yuniarta.syaumi@unej.ac.id), <sup>2</sup>[rohmadyanayu5198@gmail.com](mailto:rohmadyanayu5198@gmail.com),  
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| ARTICLE INFO                                                                                                                                                                                                                                                                                                                                                  | ABSTRACT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
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| <p><b>Article history:</b><br/>Received: July 31, 2026<br/>Accepted: Setember 3, 2026<br/>Available online on:<br/>September 5, 2026</p> <hr/> <p><b>Keywords:</b><br/><i>Training Frequency;</i><br/><i>Teacher Readiness;</i><br/><i>Deep Learning</i></p> <hr/> <p>Copyright ©2026 by Authors.<br/>Published by Universitas<br/>Muhammadiyah Tangerang</p> | <p>This study aims to examine the relationship between the frequency of training participation and the readiness of Early Childhood Education (PAUD) teachers in implementing the Deep Learning approach. Using a quantitative correlational design, the research involved 62 teachers from Gugus 1, Summersari District, Jember Regency, selected via incidental sampling. Data were collected through questionnaires and analyzed using descriptive statistics and the Spearman Rank correlation test. The findings indicate that most teachers (77%) fall into the moderate category for training frequency, while the majority (52%) demonstrate a high level of readiness. Statistical analysis yielded a correlation coefficient of 0.490 with a significance value of 0.000 (<math>p &lt; 0.05</math>), indicating a significant positive relationship of moderate strength. These results suggest that higher participation in professional training correlates with increased teacher</p> |

readiness for pedagogical innovation. The study highlights the necessity of continuous and structured professional development to bridge the gap between curriculum demands and classroom implementation.

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### **Introduction**

Early Childhood Education (ECE) in Indonesia is currently undergoing a significant phase of pedagogical transformation following the introduction of the concept of Deep Learning. In 2025, the Ministry of Primary and Secondary Education officially accelerated this approach by emphasizing three main principles: learning that is conducted consciously, is meaningful for students, and creates enjoyable learning experiences (Bali et al., 2025). As the foundation of this framework, the Ministry of Primary and Secondary Education of the Republic of Indonesia published the Academic Paper on Deep Learning, which emphasizes that this approach is not merely a change in teaching methods, but rather a transformation of the learning system toward quality, inclusive, and equitable education for all learners (Rahmawati et al., 2025). In contrast to conventional practices that often become trapped in memorization and one-way instruction, Deep Learning requires teachers to facilitate children in exploring, thinking critically, and reflecting on their learning experiences (Ruwaida et al., 2025).

The urgency of this transformation is highly relevant in the context of ECE, considering that the age of 0 to 6 years is recognized

as a crucial golden age in children's development that determines the quality of learning at subsequent educational levels. During this period, children's brains develop rapidly, and their capacity to absorb meaningful learning experiences is exceptionally high. Therefore, the quality of the learning approaches implemented by ECE teachers directly affects the trajectory of children's holistic development (Rahman & Cahyawati, 2025). However, conditions in the field indicate a gap between curriculum demands and teachers' actual readiness. Initial observations and findings from previous studies indicate that many ECE teachers still experience difficulties in developing Deep Learning Lesson Plans (Perencanaan Pembelajaran Mendalam/PPM) that are aligned with the principles of Deep Learning (Zuama et al., 2025; Prawiyogi & Rosalina, 2025). In Jember Regency, particularly in Cluster 1 of Summersari District, teachers' levels of readiness to implement this model remain varied and require further strengthening. These limitations are often rooted in insufficient understanding of the technical and practical aspects of the new learning model.

Teacher readiness is a determining factor in the successful implementation of any educational innovation. Teachers with a high level of professional readiness have the capacity to facilitate collaborative, reflective, and child-centered learning. Nevertheless, its implementation continues to face several structural challenges, including limited access to continuous professional development

programs and inadequate institutional support (Rista et al., 2025). Without adequate readiness, the implementation of Deep Learning at the ECE level will merely constitute a change in terminology without substantial changes in teacher–child interactions in the classroom (Ma’arif, 2024). The implementation of the Deep Learning approach in ECE has the potential to strengthen the quality of meaningful, mindful, and joyful learning. However, its implementation continues to encounter several significant structural challenges, including suboptimal teacher readiness and limited supporting infrastructure within educational institutions (Prawiyogi & Rosalina, 2025), underscoring the urgency of continuous training as a prerequisite for successful implementation. This is further reinforced by the findings of Rahman and Cahyawati (2025), which indicate that one of the main challenges in implementing Deep Learning-based education in ECE units is limited access to teacher training, in addition to the lack of alignment between the ECE curriculum and the principles of Deep Learning.

One of the primary instruments for building such readiness is continuous professional development, particularly through intensive training programs. Cahyani et al. (2021) revealed a very strong positive correlation between teachers’ intensity of participation in training and their level of pedagogical competence. Consistent with this finding, Andrisyah and Ismiatun (2021) demonstrated that targeted training can improve teachers’ professional competence in

developing and implementing learning tools. Furthermore, Umami and Atika (2025), in their study on the professional development of ECE teachers in Jember Regency, found that training implemented in stages through socialization, core training, and practical mentoring resulted in high levels of satisfaction and knowledge transfer, reaching 96.67% in the attitude domain and 90% in the knowledge and skills domains. These findings indicate that the quality and structure of training programs are highly influential in determining their effectiveness in improving teacher readiness. Several of these studies emphasize that teachers require practical mentoring to translate new concepts into actual classroom practices in ECE settings.

Adindan et al. (2025) revealed that training employing simulation and microteaching methods was effective in transforming the mindset of ECE teachers to become more oriented toward children's developmental processes rather than merely focusing on final outcomes. This finding helps explain why, in the present study, teachers with higher training participation frequencies demonstrated greater readiness in facing the challenges of the new curriculum.

Building on these previous studies, this research does not merely examine training as a professional development program but specifically investigates the relationship between training participation frequency and ECE teachers' readiness to implement Deep Learning. This analysis is important because most previous studies have focused on teachers' competencies in general,

perceptions of Deep Learning, or the effectiveness of training from a descriptive perspective, whereas quantitative evidence concerning the relationship between training intensity and readiness to implement Deep Learning in ECE contexts remains relatively limited.

The research problem is whether there is a relationship between training participation frequency and ECE teachers' readiness to implement Deep Learning. Based on the research problem outlined above, the objective of this study is to determine whether there is a meaningful relationship between training participation frequency and ECE teachers' readiness to implement Deep Learning. The benefits of this study are to provide a comprehensive understanding of the factors influencing ECE teachers' readiness, serve as a consideration for teachers to participate more actively in training as an effort to enhance their readiness to implement Deep Learning, and provide insights for ECE institutions and future researchers in developing programs and studies related to improving the quality of ECE learning.

### **Methods**

This study adopted a quantitative approach using a correlational research design. The correlational design was selected to determine the extent to which the frequency of training participation is associated with teachers' readiness to implement Deep Learning based on the correlation coefficient. Creswell and Creswell (2017) stated that correlational research is a research method designed to examine and measure the strength and direction of relationships between two or

more variables by employing correlation analysis as a data analysis technique (Madani, 2023). Consistent with its characteristics, correlational research does not involve manipulation of the variables under investigation; rather, researchers observe and measure naturally occurring relationships between variables (Iting et al., 2025). In this study, the analysis focused on the relationship between training participation frequency as the independent variable (X) and ECE teachers' readiness to implement Deep Learning as the dependent variable (Y).

The study was conducted over three days, from April 17 to April 19, 2026, during the even semester of the 2025/2026 academic year. The research was conducted in Cluster 1, Summersari District, Jember Regency, which consists of 14 ECE institutions. The research site was selected based on the condition that ECE institutions in Cluster 1 had participated in Deep Learning training, while implementation in the field was still in a transitional stage. This condition was considered relevant for examining the relationship between training participation frequency and teachers' readiness to implement Deep Learning.

The population in this study comprised all ECE teachers in Cluster 1, Summersari District, Jember Regency, totaling 75 teachers. However, the data successfully collected and analyzed in this study were obtained from 62 teachers. Thus, the research sample consisted of 62 teachers who were willing to complete the research questionnaire, comprising 37 respondents who completed it offline and 25

respondents who completed it online. The sampling process employed a non-probability sampling technique using incidental sampling, in which respondents encountered by the researchers and willing to complete the research instrument were included as samples. This technique is appropriate when researchers access respondents who are available during the data collection process.

Research data were collected using a closed-ended questionnaire developed in Google Forms and distributed in two ways: directly during cluster meetings and online through teachers' WhatsApp groups. The questionnaire was used to obtain data on training participation frequency and teachers' readiness to implement Deep Learning. Measurement in this study employed a questionnaire based on a four-point Likert scale. The questionnaire was developed based on indicators of teachers' readiness to implement Deep Learning, incorporating both favorable and unfavorable statements to obtain more objective responses.

**Table 1.** Questionnaire Blueprint for Teachers' Readiness to Implement Deep Learning

| Indicator              | Favorable<br>Questionnaire<br>Items | Unfavorable<br>Questionnaire<br>Items | Total |
|------------------------|-------------------------------------|---------------------------------------|-------|
| <i>Appropriateness</i> | 5, 6, 7, 9, 11                      | 1, 2, 3, 4, 8, 10, 12                 | 12    |
| <i>Change efficacy</i> | 13, 15, 16, 17, 18,<br>19           | 14                                    | 7     |

|                                  |                |        |           |
|----------------------------------|----------------|--------|-----------|
| <i>Management support</i>        | 21, 22         | 20, 23 | 4         |
| <i>Personal benefit</i>          | 24, 25, 26, 27 | 0      | 4         |
| <b>Total Questionnaire Items</b> |                |        | <b>27</b> |

The questionnaire on training participation frequency in this study was designed to collect data on ECE teachers' involvement in Deep Learning training. The questionnaire consisted of closed-ended statements with response options representing teachers' participation frequency, allowing the resulting data to indicate the intensity of teachers' involvement in training activities as one of the factors presumed to be associated with their readiness to implement Deep Learning. Before being used, the instrument was tested to establish content validity through expert assessment and item validity using the corrected item-total correlation. The results showed that, of the 36 items after revision, 27 items were valid and were used in the study. The reliability test using Cronbach's Alpha yielded a score of 0.930, indicating that the instrument was highly reliable.

To analyze the data, the researchers employed descriptive statistical techniques accompanied by correlational analysis. Descriptive analysis was used to describe the frequency distribution of training participation and teacher readiness, whereas correlational analysis was used to determine the relationship between the two

variables (El Hasbi et al., 2023). To examine the relationship between training participation frequency and ECE teachers' readiness to implement Deep Learning, this study employed a correlation test appropriate to the type of data, namely the Spearman Rank correlation test. The results of the analysis were then interpreted to determine the direction and strength of the relationship. The strength of relationships between variables in correlational research can be interpreted based on the criteria proposed by Sugiyono (as cited in Janah, 2021). The criteria are presented in the following table.

**Table 2.** Correlation Coefficient Criteria

| Correlation Coefficient | Relationship Criteria |
|-------------------------|-----------------------|
| 0.00–0.199              | Very weak             |
| 0.20–0.399              | Weak                  |
| 0.40–0.599              | Moderate              |
| 0.60–0.799              | Strong                |
| 0.80–0.100              | Very strong           |

In this study, hypothesis determination was based on a significance level of 0.05. Based on the statistical test results, a significance value below 0.05 indicates that  $H_0$  is rejected and  $H_a$  is accepted. This confirms the existence of a significant relationship between the intensity of training participation and the level of ECE teachers' readiness to implement Deep Learning. When the significance value is  $> 0.05$ , the alternative hypothesis cannot be accepted, and therefore  $H_0$  is retained. Substantively, this means that there is no significant relationship

between training participation frequency and teachers' readiness in this context.

**Result and Discussions**

The description of teachers' frequency of participation in Deep Learning training was developed based on the hypothetical score obtained. Based on the calculation results, the data were then classified into three levels, namely high, moderate, and low. The details of the frequency distribution for each category are presented in the following table.

**Table 3.** Classification Values for Training Participation Frequency

| Category | Classification                             |
|----------|--------------------------------------------|
| Low      | $x \leq \mu - 1(\sigma)$                   |
| Moderate | $\mu - 1(\sigma) < x \leq \mu + 1(\sigma)$ |
| High     | $x > \mu + 1(\sigma)$                      |
| Low      | $x \leq 1.67$                              |
| Moderate | $1.67 < x \leq 3.33$                       |
| High     | $x > 3.33$                                 |

**Table 4.** Frequency of Training Participation

| Training Participation Frequency | Frequency | Percentage  |
|----------------------------------|-----------|-------------|
| Low                              | 9         | 15%         |
| Moderate                         | 48        | 77%         |
| High                             | 5         | 8%          |
| <b>Total</b>                     | <b>62</b> | <b>100%</b> |

The description of ECE teachers' level of readiness to implement Deep Learning was developed based on the hypothetical scores obtained. Based on the calculation results, the data were then classified into three levels, namely high, moderate, and low. The details of the frequency distribution for each category are presented in the following table.

**Table 5.** Classification Criteria for Teachers' Readiness to Implement Deep Learning

| Category | Classification                             |
|----------|--------------------------------------------|
| Low      | $x \leq \mu - 1(\sigma)$                   |
| Moderate | $\mu - 1(\sigma) < x \leq \mu + 1(\sigma)$ |
| High     | $x > \mu + 1(\sigma)$                      |
| Low      | $x \leq 54$                                |
| Moderate | $54 < x \leq 81$                           |
| High     | $x > 81$                                   |

**Table 6.** Teachers' Readiness to Implement Deep Learning

| Teachers' Readiness to Implement Deep Learning | Frequency | Percentage  |
|------------------------------------------------|-----------|-------------|
| Low                                            | 0         | 0%          |
| Moderate                                       | 30        | 48%         |
| High                                           | 32        | 52%         |
| <b>Total</b>                                   | <b>62</b> | <b>100%</b> |

The frequency distribution of the research results shows that the majority of respondents were classified as having a high level of

readiness, with 32 respondents (52%). Meanwhile, 30 respondents (48%) were classified as having a moderate level of readiness, while no respondents were found in the low-readiness category. These findings indicate that the level of readiness of ECE teachers in Cluster 1, Summersari District, Jember Regency, tends to fall within the high category.

The results of the cross-tabulation between training participation and teacher readiness are presented in the following table.

**Table 7.** Results of the Cross-Tabulation Test of Training Participation and Teacher Readiness

| Training Participation | Category       | Low  | Moderate | High   | Total  |
|------------------------|----------------|------|----------|--------|--------|
| 1 time                 | Frequency      | 0    | 17       | 11     | 28     |
|                        | Percentage (%) | 0.0% | 60.7%    | 39.3%  | 100.0% |
| 2–3 times              | Frequency      | 0    | 7        | 13     | 20     |
|                        | Percentage (%) | 0.0% | 35.0%    | 65.0%  | 100.0% |
| Never                  | Frequency      | 0    | 6        | 3      | 9      |
|                        | Percentage (%) | 0.0% | 66.7%    | 33.3%  | 100.0% |
| Others                 | Frequency      | 0    | 0        | 5      | 5      |
|                        | Percentage (%) | 0.0% | 0.0%     | 100.0% | 100.0% |

|              |                   |             |              |              |               |
|--------------|-------------------|-------------|--------------|--------------|---------------|
| <b>Total</b> | Frequency         | <b>0</b>    | <b>30</b>    | <b>32</b>    | <b>62</b>     |
|              | Percentage<br>(%) | <b>0.0%</b> | <b>47.6%</b> | <b>50.8%</b> | <b>100.0%</b> |

Based on the crosstab analysis, teachers who had participated in Deep Learning training tended to demonstrate higher readiness than teachers who had never participated in training. Among teachers who had participated in training once, the majority were classified as having moderate readiness, comprising 17 respondents, while 11 respondents were classified as having high readiness. Among teachers who had participated in training 2–3 times, the number of respondents with high readiness was 13, which was greater than the number in the moderate-readiness category, which comprised 7 respondents.

Meanwhile, among teachers who had never participated in training, the majority were classified as having moderate readiness, comprising 6 respondents, although a small proportion, consisting of 3 respondents, were still classified as having high readiness. Likewise, in the other category, all respondents were classified as having high readiness, comprising 5 respondents. This indicates that

To test the hypothesis concerning the relationship between training participation frequency and ECE teachers’ readiness to implement Deep Learning, a statistical analysis was conducted. The table below presents a summary of the statistical analysis using the Spearman correlation test.

**Table 8.** Hypothesis Test Results

| Variable                                           | Spearman Rank Correlation | Significance | Conclusion                    |
|----------------------------------------------------|---------------------------|--------------|-------------------------------|
| ECE teachers' readiness to implement Deep Learning | 0.490                     | 0.000        | Correlation exists (moderate) |
| Training participation frequency                   |                           |              |                               |

Based on the results of the Spearman correlation test, there was a significant relationship between training participation frequency and ECE teachers' readiness to implement Deep Learning. The empirical evidence shows that the significance value of 0.000 is lower than 0.05, indicating a significant relationship; therefore,  $H_a$  is accepted. The correlation coefficient of 0.490 places this relationship at a moderate level of strength. The positive direction of the relationship indicates that training frequency is an important factor associated with teacher readiness; that is, increased participation in training is accompanied by increased readiness among ECE teachers to implement Deep Learning. Conversely, a low frequency of participation in professional development training tends to be associated with lower teacher readiness to respond to this curriculum innovation.

The findings demonstrate a significant positive correlation between training participation frequency and early childhood education teachers' readiness to implement deep learning, with a correlation coefficient of 0.490, indicating a moderate relationship, and a significance value of 0.000. The distribution of readiness levels, with 52% of teachers categorized as highly ready and 48% as moderately ready, indicates that teachers in Cluster 1, Summersari District, generally possess a relatively good foundation for implementing deep learning. The cross-tabulation further shows that teachers who participated in training more than twice tended to have a higher proportion of high readiness than those who had participated only once or had never attended training. Nevertheless, the presence of highly ready teachers who had never attended training suggests that readiness is not determined solely by formal training but may also be shaped by teaching experience, peer interaction, access to information, and self-directed learning. Thus, training participation frequency appears to be an important factor, although not the only determinant of teachers' readiness.

This finding is consistent with Cahyani et al. (2021), who reported that participation in professional development activities is associated with teachers' pedagogical competence. Repeated training provides opportunities for teachers to strengthen conceptual understanding, correct misconceptions, and develop confidence in applying new instructional approaches. This is particularly relevant to deep learning,

which requires teachers to facilitate learning that is mindful, meaningful, and joyful rather than merely transmit content (Fullan et al., 2018). Training therefore functions as a mechanism for supporting teachers' transition from content providers to facilitators of meaningful learning experiences (Kennedy, 2021). Similarly, Eliza et al. (2022) emphasized the importance of professional development in strengthening teacher competence. Studies by Zuama et al. (2025) and Umami and Atika (2025) further indicate that intensive training can improve teachers' conceptual understanding and practical skills, including lesson planning and classroom implementation.

However, the moderate strength of the correlation ( $r = 0.490$ ) indicates that training frequency alone does not fully explain teachers' readiness. Continuous mentoring, institutional support, teaching experience, motivation, and access to learning resources may also contribute to readiness. Ruwaida et al. (2025) highlighted the importance of participatory mentoring in helping teachers translate training outcomes into actual classroom practice. Conversely, limited time, workload, and insufficient opportunities for continuous professional development can constrain teachers' capacity to adopt new approaches (Fiatunnabilah et al., 2025; Novitasari et al., 2025). Teachers may also encounter barriers related to time management, domestic responsibilities, and attachment to established work patterns (Hilmiyah et al., 2023). Therefore, professional development programs should not

focus solely on increasing the number of training sessions but should emphasize continuity, practical relevance, and follow-up mentoring.

The practical implication is that PAUD institutions and relevant stakeholders should provide structured and sustainable professional development opportunities that combine training, practice, and mentoring. Such programs should address not only teachers' technical competence but also their readiness to adopt new pedagogical perspectives and design meaningful learning experiences for children. Overall, the findings suggest that greater participation in professional training is associated with higher teacher readiness, while the moderate correlation indicates the need to strengthen other supporting factors to ensure more equitable and sustainable implementation of deep learning.

This study has two main limitations. First, data were collected solely through questionnaires, making the findings dependent on respondents' honesty and interpretation of the items. Second, the study examined only training participation frequency as a predictor, although other factors, such as teaching experience, motivation, institutional support, and access to information, may also influence teachers' readiness to implement deep learning.

### **Conclusion**

Based on the research findings, the frequency of ECE teachers' participation in training in Cluster 1, Summersari District, was categorized as moderate, while teachers' readiness to implement Deep

Learning tended to fall into the high category. The cross-tabulation results indicate that teachers who participated in training more frequently tended to demonstrate better readiness to implement Deep Learning. The Spearman correlation test yielded a significance value of 0.000 and a correlation coefficient of 0.490. Therefore, it can be concluded that there is a positive and significant relationship, with a moderate strength of association, between training participation frequency and ECE teachers' readiness to implement Deep Learning. Future researchers are advised to incorporate other variables that may influence teacher readiness, such as teaching experience, motivation, institutional support, and access to learning resources, to provide a more comprehensive understanding of the factors influencing ECE teachers' readiness.

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