Application of Deep Learning in Meaningful Learning, Through Fun Learning Practices in Kindergarden

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Keywords: Deep Learning, Meaningful Learning, Through Fun Learning, Kindergarden.

Abstract: This research is conducted to see the effectiveness of deep and enjoyable learning for early childhood, which can involve all of the child's senses and maximally stimulate the child's growth and development based on the principles of Mindful, Meaningful, and Joyful learning. Research conducted at TK Islam Terpadu Yadiaksa Dharmasya, Learning theme of Vegetable Plants. This study uses a quantitative research method with a type of Quasi Experimental Design and a form of Nonequivalent Control Group Design. The instruments used in this research employ an observation sheet in the form of a checklist (√). The data collection techniques in this research use observation techniques and documentation techniques. The data analysis techniques in this research test validity, descriptive statistics, normality, independent sample t-test, homogeneity, and paired sample t-test using statistics with the help of SPSS. Based on the calculated t value using the t-test with Sig. (2-tailed) = 2.563 < 2.048, this means that Ha is accepted and Ho is rejected. Based on the results, it can be concluded that there is an influence of Deep Learning Implementation on the kognif development of children in Kindergarten. The statistical test using the t-test with a significance level of 0.05% resulted in a t-value obtained (2,568) > t-table value (2.048), thus H0 is rejected. Based on the research results, it can be concluded that deep learning influences children's motor development. Deep learning is more effective in stimulating children's motor development. This research has found that deep learning has a significant impact on the motor development of children in kindergarten.

1 INTRODUCTION

Kindergarten as the foundational stage of education faces challenges in creating interactive, enjoyable learning methods that are suitable for children's characteristics. In this context, deep learning can play a role in enhancing the effectiveness of learning. Deep learning refers to a learning approach that encourages deep understanding, active engagement, and the ability to apply knowledge in various contexts. Deep learning is a process involving strong contextual understanding that goes beyond mere memorization of information (Mehta 2019). Deep learning includes the acquisition of 6 global competencies: citizenship character, collaboration, communication, creativity, and critical thinking (Fullan, M., Quinn, J., & McEachen, J. 2017). This approach is taken to produce learning that not only masters the content but is also able to apply knowledge to solve problems in the real world. In applying deep learning, there are at least three main pillars that are used as a foundation in its application or implications. The three main pillars are mindful learning, meaningful learning, and joyful learning (Mehta, J., & Fine, S. 2019). Deep learning as the acquisition of 6 global competencies: citizenship character, collaboration, communication, creativity, and critical thinking (Fullan, M., Quinn, J., & McEachen, J. 2017). This approach is implemented to produce learning that not only masters the content but also applies knowledge to solve real-world problems. In implementing deep learning, there are at least three main pillars used as a foundation for its application or implications. The three main pillars are mindful learning, meaningful learning, and joyful learning (Mehta, J., & Fine, S. 2019).

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Mindful Learning is an approach that encourages children to learn with full awareness of what they are doing, feeling, and learning. It helps children build focus and emotional regulation (Fullan, M., Quinn, J., & McEachen, J 2017). Meaningful Learning means learning that is connected to the child's experiences and the real world. It helps children form meaning and build long-term understanding. Joyful Learning emphasizes that the learning process should be enjoyable and involve positive feelings, as good emotions support engagement and memory (Taguma, M., & Barrera, M. 2019).

Due to the extensive scope of this research, the researcher focuses more on how deep learning with Mindful Learning, Meaningful Learning, and Joyful Learning can stimulate children's cognitive development. Cognitive development in early childhood can be defined as knowing or the process of knowing, organizing, and using knowledge (Hasibuan & Suryana, 2021). Cognition is the ability to learn, think about learning new concepts, understand what is happening in the surrounding environment, and the skill of using memory (Draganoudi et al., 2021). Cognitive can also be defined as the ability to understand something. The ability to comprehend something, with a child's cognitive ability, they will be able to act and choose between right and wrong, and solve problems in their lives. Cognitive development for children aged 4-6 years includes (1) learning through problem-solving (2) logical thinking, (3) symbolic thinking. (Ministerial Regulation No. 4 of 2022). A child's cognitive development is also influenced by their inner child (Suriana, 2023) therefore the environment needs to stimulate the child's development. The importance of implementing learning is to help children solve problems that exist in their environment (Junita et al., 2021). facilitating children to understand the theme (Rofieq et al., 2019), enhancing problem-solving development, logical thinking (Ummah et al., 2019). The implementation of deep learning is effective to apply because it can enhance children's development in Kindergarten (Valen & Satria, 2021; Natty et al., 2019), deep learning is implemented in Kindergarten to improve children's development (Faridah et al., 2022; Abidin et al., 2020). In the implementation of deep learning, we will also need technological media, in this case, the researcher uses educational game media. Educational games have been effective in enhancing child development (Suryana, 2024; Rakimahwati & Hanifah, 2022), educational games can improve concentration (Rakimahwati & Hanifah, 2022; Borman & Erma, 2018), problem-solving skills (Harris & Isyanti, 2021), stimulate children to develop, and can generate ideas for determining the learning to be conducted (Suryana, 2025). Development can enhance cognitive development in children (Langer, E. J. 2020, Fullan, M., 2017, Ramakrishnan, K, 2024).

2 METHOD

This research is a quantitative experimental study, using two classes, namely a control class and an experimental class. The implementation of the research was conducted by comparing the two classes, where one class was treated using a deep learning model and the control class was treated using conventional teaching methods, group learning in the classroom, or teacher-centered learning. In this study, the population consists of 30 children in kindergarten, with two different classes, 15 children in the experimental class, and 15 children in the control class. This research was conducted at TK Islam Terpadu Yadiaksa in West Sumatra.

The instrument used in this study is an observation sheet in the form of a checklist (√). The data collection techniques in this study use observation techniques and documentation techniques. The data analysis techniques in this study test validity, descriptive statistics, normality, independent sample t-test, homogeneity, and paired sample t-test using statistics with the help of SPSS. Based on the calculated t value using the t-test with Sig. (2-tailed) = $0.001 < 0.05$, this means that Ha is accepted and Ho is rejected.

Evaluation Criteria for tools to measure motor skills in kindergarten children using tools to assess motor development, with a numerical scale ranging from 1 to 4, corresponding to different degrees of development: (1) Not Developed; (2) Starting to develop; (3) Developing as expected; (4) Developing Very well. The assessment tool used is a daily checklist for children's motor development. This instrument was first tested for validity (authenticity) and reliability (dependability). Data obtained from the daily checklist were analyzed using homogeneity and normality tests. The post-test homogeneity test aims to determine the follow-up for the difference test (t-test) that will be used. The normality test of the data aims to determine whether the final test data is normally distributed or not.

3 RESULT AND DISCUSSION

3.1 Result

The result of the implementation of deep learning in the Integrated Islamic Kindergarten Yadiaksa aimed at providing experiences and stimulating children's cognitive development, as preparation for their daily lives. The effectiveness of the learning was tested using hypothesis testing with a t-test. Before conducting the t-test, normality and homogeneity tests were performed on the research results. After conducting normality tests on the experimental and control classes, Ho and Ha were obtained at a significance level of 0.05, and for N15, it can be seen in table 1 below.

Table 1: Results of the Liliefors test calculations for the Experimental Class and Control Class.

No	Class	N	Lo	Lt	note
1.	Experiment	15	0.1783	0.22	Normal
2.	control	15	0.1641	0.22	Normal

In Table 1. Above, the experimental class has a calculated L value of 0.1783, which is less (<) than the table L value of 0.22 for α 0.05. The experimental class value is derived from normally distributed data. In the control class, a calculated L value of 0.1641 is obtained, which is also less (<) than the table L value of 0.22 for α 0.05. This means that the control class data also comes from normally distributed data. The homogeneity test was carried out using the Bartlett test. This test is conducted to see whether the data comes from homogeneous classes, between the experimental class and the control class. If the calculated chi-square is < the table chi-square, it means the data comes from a homogeneous class. Effectiveness Percentage = Ideal Score / Maximum Score x 100%.

Table 2: Results of Homogeneity Test Calculation.

Class	A	X2hitung	X2tabel	Conclusion
Experiment	0.05	0.1512	3.841	Homogen
Control	0.05			N

Table 2 above shows the results of the X2 calculation in the experimental class and the control class, where it is larger than the X2 table (X2 calculated < X2 table), indicating that the experimental class and the control class have homogeneous variance. After conducting normality and homogeneity tests, it was found that both sample classes are normally distributed and have homogeneous variance. Therefore, hypothesis testing can proceed using the t-test technique.

If t calculated > t table, then the null hypothesis is rejected and the alternative hypothesis is accepted.

If t calculated < t table, then the null hypothesis is accepted and the alternative hypothesis is rejected.

The following will illustrate the data processing with the t-test.

Based on the results of the child development observation sheet conducted by the teachers, the average development score of the experimental class is 83.02, which is greater than the control class score of 75.07. Thus, the deep learning in the integrated Islamic kindergarten Yadiasa can be clearly seen in the table below.

Table 3: Effectiveness of Deep Learning to Improve Children's Cognitive Development.

Item				Kelas Experimen		Kelas Kontrol
Nilai Rata –rata				83		75
Anak Yang Belum Berkembang				13		11
Dalam %				86 %		75%
Anak yang Belum Berkembang				2		4
No	Kelompok	N	Nilai rata-rata	t_{hitung}	T_{tabel}	Keputusan
1	Experimen	15	83	2,563	2,048	Tolak H_0
2	Kontrol	15	75			

The following will describe data processing using the t-test:

In the table above, the df table for a significance level of α=0.05 (5%) shows a critical t value of 2.048, thus the calculated t value is greater than the critical t value (2.563 < 2.048). Therefore, the hypothesis H a is accepted and H o is rejected. It is concluded that there is a significant effectiveness on the stimulation of children's cognitive development when using deep learning. The average score obtained by learning using deep learning is higher than that of the class using other methods. This research acknowledges that the use of deep learning is very effective in kindergarten education. The hypothesis test conducted to see the difference in scores between the experimental class and the control class is suspected. There are two hypotheses in this study, namely the first hypothesis (H0), which is a preliminary assumption of the research, and the second hypothesis (H1), which can be seen from the results of the research conducted. From the T-test, we can observe the average in each control group and experimental group. Thus, the results of the hypothesis testing show the difference in the effectiveness of deep learning and conventional learning models. The deep learning model can enhance children's development in kindergarten. The success of the research is proven by the increase in children's cognitive development. The data analysis results obtained show that deep learning has a significantly greater impact on children's cognitive development than the conventional learning model.

Education in Kindergarten (TK) plays a crucial role in shaping the foundation of a child's overall development. During this time, children are in a phase of exploration, play, and learning through concrete experiences. In the context of the Independent Curriculum which emphasizes differentiated learning and the psychological well-being of children, the application of deep learning technology can be one of the important innovations. On the other hand, the approaches of Mindful Learning, Meaningful Learning, and Joyful Learning are increasingly recognized as essential elements in early childhood education. With deep learning technology, learning can be adaptively tailored to children's needs in real-time.An example of how Mindful Learning can be implemented is by introducing the topic of plants, which will be learned through educational games and instructional videos. By using educational videos, the benefits of vegetables, various types of vegetables, and how to plant vegetables will be explained.

Figure 1: Mindful Learning activities.

After the child understands the concept, it is continued with the form of Meaningful Learning. Meaningful Learning means learning that is connected with the child's experiences and the real world. It helps the child to form meanings and build long-term understanding. In this activity, children will be taken to a vegetable garden, where they will be taught how to plant vegetables and pick vegetables; in this case, the children will be directly involved.

Figure 2: Meaningful Learning Activities.

The Joyful Learning approach emphasizes that the learning process should be enjoyable and involve positive feelings, as good emotions support engagement and memory retention. In support of this, educators will harvest vegetables together with the children and cook the vegetables at school.

Figure 3: The form of Joyful Learning.

Based on the results of implementing deep learning at the Integrated Islamic Kindergarten Yadiaksa, focusing on vegetables. It was found that the implementation of deep learning makes children enthusiastic during activities, helps them understand that vegetables are healthy food, fosters a love for plants, and a liking for vegetables. Most importantly, it stimulates children's cognitive abilities, enhances problem-solving skills through games, encourages critical thinking, symbolic thinking can be stimulated, and through the practice of planting vegetables, harvesting them, and cooking vegetables, children can think logically, solve problems, and become more independent. Overall, the deep learning model can enhance six aspects of children's development, in addition to providing benefits for the children, Among other things, it can strengthen children's character in developing active potential, children can also design their own learning, so that they can be skilled, have a resilient attitude, and possess knowledge in carrying out projects, children can manage the allotted time. (Sulistyani Puteri Ramadhani, Zulela MS, 2021) Deep learning can also train the ability to solve problems, be responsible and care for the surrounding environment, as well as take pride in the results achieved. Meanwhile, the weakness of deep learning implementation is that educators are not yet able to design themes to the fullest because deep learning has not been commonly integrated into the teaching and learning process (PBM) so far. Educators are still struggling and need habituation to link with theme and sub-theme materials. In addition, the activities conducted have the potential to consume a lot of time because children enthusiastically dig for information, making them lose focus on the results of their practice. Moreover, educators are also unable to provide examples of products that can serve as input sources because deep learning is relatively new for preschool-aged children. Teachers do not feel they have maximized in creating modules and lesson plans

(RPP) due to the absence of a comprehensive guidebook for teachers on deep learning, especially in Kindergarten. It is also challenging for teachers to observe student progress because there is no clear assessment guidebook for deep learning. That deep learning affects children's thinking creativity, because in deep learning they are stimulated to be able to generate ideas, work in groups, and produce creative projects. Abidin et al. (2020) also conducted research showing that deep learning is effective in enhancing child development. The deep learning model influences child development because in both the experimental and control classes, descriptively, the development of children using deep learning is higher compared to the control class.

4 CONCLUSIONS

The effectiveness of deep learning in the Integrated Islamic Kindergarten Yadiaksa is effective in stimulating children's cognitive development, evidenced by the average differences between the experimental class and the control class. The assessment was carried out through observational activities when children were engaged in play, observational assessments from the results of deep learning activities, as well as assessments using daily checklist sheets. The evaluation results show that the standard level of child development achievement can develop as expected, with an average of 83% of all development aspects and indicators being at the expected developmental stage (BSH) and very good development stage (BSB) after using deep learning. The application of deep learning can realize active group learning, which can enhance children's development. The activities of deep learning undertaken by children develop their talents and creativity, as well as conceptual understanding, which can be achieved through problem-solving alongside deep learning activities within a specified timeframe. Deep learning conducted by children in group activities can increase children's skills and responsibility towards assigned tasks, thus allowing them to develop and be optimally stimulated. Deep learning in kindergarten has great potential to support the Mindful, Meaningful, and Joyful Learning approach, creating adaptive, personalized, and enjoyable learning experiences. However, the success of this integration heavily relies on teachers' readiness, technological infrastructure, and the selection of child-friendly applications. Therefore, teacher training and inclusivity need to be a primary focus.

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