



The Effect Of Deep Learning Approach On The Language Development Of 5-6 Year Old Children

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Abstract: This study aims to analyze the effect of the *Deep Learning* approach on the language development of children aged 5-6 years at TK IT Nurul Ilmi, Deli Serdang Regency, North Sumatra. The study employed a quantitative approach with a quasi-experimental design using a *Non-Equivalent Control Group Design*. The sample consisted of 20 children divided into experimental and control groups using total sampling. Data were collected through observation, pretest, posttest, and documentation, with indicators covering listening, speaking, vocabulary, and communication skills. The results showed that the mean score of the experimental group increased from 33.80 to 55.20, representing an improvement of 21.40 points. The Wilcoxon test yielded $Z = 2.809$ with a significance value of $0.005 < 0.05$, indicating a significant difference between the scores before and after the learning intervention. The N-Gain score was 0.817 or 81.7%, which falls into the high category. Thus, the *Deep Learning* approach demonstrated an increase in children's language development during the study period through *mindful*, *meaningful*, and *joyful* learning, providing active, contextual, and communicative learning experiences for young children.

Keywords: Deep Learning, language development, children aged 5-6 years, early childhood education, quasi-experimental.

Abstrak: Penelitian ini bertujuan untuk menganalisis pengaruh pendekatan *Deep Learning* terhadap perkembangan bahasa anak usia 5-6 tahun di TK IT Nurul Ilmi, Kabupaten Deli Serdang, Sumatera Utara. Penelitian menggunakan pendekatan kuantitatif dengan desain quasi-experimental tipe *Non-Equivalent Control Group Design*. Sampel berjumlah 20 anak yang dibagi menjadi kelompok eksperimen dan kontrol melalui teknik total sampling. Data dikumpulkan melalui observasi, pretest, posttest, dan dokumentasi, dengan indikator kemampuan menyimak, berbicara, kosakata, dan komunikasi. Hasil menunjukkan rata-rata skor kelompok eksperimen meningkat dari 33,80 menjadi 55,20, dengan peningkatan 21,40 poin. Uji Wilcoxon menghasilkan $Z = 2,809$ dan signifikansi $0,005 < 0,05$, menunjukkan perbedaan signifikan antara skor sebelum dan sesudah pembelajaran. Nilai N-Gain sebesar 0,817 atau 81,7% berada pada kategori tinggi. Dengan demikian, pendekatan *Deep Learning* menunjukkan adanya peningkatan perkembangan bahasa anak selama periode penelitian melalui pembelajaran yang *mindful*, *meaningful*, dan *joyful*, sehingga memberikan pengalaman belajar yang aktif, kontekstual, dan komunikatif bagi anak usia dini.

Kata Kunci: Deep Learning, Perkembangan Bahasa, Anak Usia 5-6 Tahun, Pendidikan Anak Usia Dini, Quasi-Experimental.

INTRODUCTION

Early childhood education is an important stage in building various aspects of development, including language (Sitorus, 2023). At ages 5-6, children develop their communication skills, understand instructions, share ideas, ask questions, tell stories, and use vocabulary in a more complex way. Language skills also form the foundation for cognitive, social-emotional development, as well as readiness for the next stage of education (Khadijah & Nurul, 2020). Therefore, learning needs to give children the chance to interact, explore, and use language in meaningful experiences.

However, language development still faces challenges, especially when learning is too teacher-centered, repetitive, and limited in giving opportunities for discussion. Kids might be able to follow instructions, but they haven't had enough space to ask questions, share opinions, talk about their experiences, and explain their ideas (Vartiainen, Tedre, & Valtonen, 2020). This condition shows that language learning needs to focus not just on mastering vocabulary, but also on the child's ability to understand, communicate, and actively connect experiences.

One relevant approach is deep learning. In education, this approach emphasizes learning experiences that are mindful, meaningful, and joyful. In early childhood education, it can be applied through activities like playing, storytelling, conversations, exploring the environment, role-playing, simple projects, and collaborative activities (Salsabillah, Imtihana, Oktamarina, & Mardeli, 2026). The activity gives kids a chance to learn through experience while naturally using language.

The deep learning approach is relevant to language development because a child's language skills grow through interaction and contextual experiences. When children observe objects, have discussions, ask questions, share experiences, and convey their understanding, they are not just practicing speaking, but also learning to understand the meaning of communication (Widowati, 2025). In this way, this approach can provide stimulation for listening and speaking skills, enriching vocabulary, constructing sentences, and expressing ideas in a more structured way.

In the context of TK Nurul Ilmi, children aged 5-6 need learning experiences that match their developmental characteristics. Using deep learning can give kids the chance to get directly involved in activities, talk, ask questions, share opinions, and tell about their experiences. Teachers act as facilitators who create a fun and active learning environment so that children's verbal interactions can grow through various meaningful experiences.

Based on this explanation, research is needed to find out the effect of the deep learning approach on language development in children aged 5-6 years. This study is aimed at analyzing the impact of the deep learning approach on language development in 5-6 years old children at TK Nurul Ilmi. The results of the study are expected to provide empirical evidence regarding the implementation of deep learning and serve as a consideration for teachers in designing language learning that is active, meaningful, contextual, and fun.

Research on deep learning in early childhood is starting to develop with various focuses. Research (Mutmainna, Intisari, & Amri, 2026) developing deep learning to improve critical thinking skills of 5-6 years old children through interactive and project-based activities. Research (Tabe, Tampani, Lakes, Moni, & Amseke, 2026) studying deep learning based on Project Based Learning at TK Nurul Falah Surabaya and finding meaningful learning experiences through real projects. Meanwhile, (Missa, et al., 2026) emphasizing meaningful, reflective learning, and active child engagement. Those three studies show the application of deep learning in early childhood education, but they haven't specifically focused on the language development of 5-6 year-olds as the main variable tested quantitatively.

The gap can also be seen in research on language development. (Baun, et al., 2026) studying Project Based Learning to develop the cognitive and language skills of 5-6 year old children, while (Hastuti, Dewi, & Rahmianti, 2025) researching learning media on children's language intelligence. Although it shows the importance of active learning, the study hasn't specifically tested deep learning that integrates conscious, meaningful, and fun learning. (Dwijantie, 2025) has studied deep learning on the language development of 5-6 year-old children at PAUD Hosana Sungkaen with an R^2 value of 0.892. The findings show the need for research in different institutional contexts to see the application of this approach more broadly.

Based on this gap, the novelty of the study titled "The Influence of Deep Learning Approaches on Language Development of 5-6 Year-Old Children at TK Nurul Ilmi" lies in the empirical testing of deep learning on language development in the context of TK Nurul Ilmi. The new aspect of this research is in applying learning experiences that encourage children to observe, ask questions, have dialogues, share experiences, and express ideas in a fun way. In this way, this



study complements previous studies that mostly focused on critical thinking, projects, and learning implementation, by giving special attention to language development as a learning outcome.

METHOD

This study uses a quantitative approach with a quasi-experimental design through a Non-Equivalent Control Group Design. The quantitative approach is used because the study aims to obtain data in the form of language development scores, which will then be statistically analyzed to examine the impact of the deep learning approach on the language development of children aged 5-6 years. According to (Creswell, 2018), Quantitative research is used to test the relationships or effects between variables through measurements of numerical data and statistical analysis. Meanwhile, experimental design is used when researchers apply certain treatments and observe the changes that occur in the variables being studied (Sugiyono, 2022). The use of the Non-Equivalent Control Group design is suitable for educational research because the experimental and control groups can be compared through pre- and post-treatment measurements, even though the subjects are not fully randomly assigned.

The research was carried out at TK IT Nurul Ilmi, Deli Serdang Regency, North Sumatra, in the second semester of the 2025/2026 academic year. The study population included all children aged 5-6 years in Group B. The sampling technique used was saturated sampling (total sampling), meaning all members of the population were used as research samples. According to (Sugiyono, 2022), Saturated sampling is a technique for determining a sample when all members of a population are taken as the sample. This technique is relevant to use when the population size is relatively small, allowing the researcher to involve all members in the study. The participants are then divided into an experimental group and a control group. The experimental group receives learning using a deep learning approach, while the control group receives conventional learning.

Data was collected through observation, pretests, posttests, and documentation. Observations were used to gather data on children's language development during the learning process, while pretests and posttests were used to find out the language ability before and after the treatment. The research instruments consisted of language development observation sheets covering listening skills, speaking, vocabulary mastery, and communication ability. The preparation of research instruments needs to be based on clear variable indicators so that the data obtained can represent the constructs being measured (Sugiyono, 2022). Child development assessment uses four categories: Not Yet Developing (BB), Starting to Develop (MB), Developing as Expected (BSH), and Developing Very Well (BSB). Documentation is used as supporting data, including student data, the learning process, and documentation of research activities.

The data obtained was then analyzed using descriptive and inferential statistics. Descriptive statistics were used to describe the characteristics of the data through the mean, minimum score, maximum score, and other statistical measures. Then, prerequisite tests were conducted, including normality tests and homogeneity tests, before performing parametric analysis. According to (Ghozali, 2018), Assumption testing is needed to make sure that the statistical techniques used match the characteristics of the research data. If the data meet the assumptions of normality and homogeneity, hypothesis testing is done using an independent-samples t-test. This test is used to find out whether there is a difference in the average language development between the experimental group and the control group after the treatment. The testing is done at a significance level of $\alpha = 0.05$. If the Sig. (2-tailed) value < 0.05 , then there is a significant difference between the two groups, whereas if the Sig. (2-tailed) value ≥ 0.05 , the difference is not statistically significant (Ghozali, 2021). The independent-samples t-test formula can be stated as follows:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2} \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}}$$



Note:

t = calculated t value;

X_1 = mean of the experimental group;

X_2 = mean of the control group;

S_1^2 = variance of the experimental group;

S_2^2 = variance of the control group;

n_1 = sample size of the experimental group;

n_2 = sample size of the control group.

Statistical analysis was done using statistical software to improve the accuracy of data processing and interpretation. With this procedure, the study can provide empirical evidence on the differences in language development between children who receive a deep learning approach and those who receive conventional learning.

RESULT AND DISCUSSION

Result

Pretest and Posttest

To protect the privacy and confidentiality of the children participating in the study, their identities are presented using participant codes (P1-P10) rather than their actual names. Table 1 presents the pretest and posttest scores of children's language development in the experimental group before and after the implementation of the Deep Learning approach.

Table 1. Recapitulation of Pretest and Posttest Scores of Children's Language Development in the Experimental Group

No.	Participant Code	Pretest	Posttest	Difference
1	P1	36	64	28
2	P2	32	48	16
3	P3	38	64	26
4	P4	20	26	6
5	P5	34	48	14
6	P6	38	64	26
7	P7	30	46	16
8	P8	36	64	28
9	P9	40	64	24
10	P10	34	64	30
Mean		33.80	55.20	21.40

Based on Table 1, the mean score of children's language development in the experimental group increased from 33.80 in the pretest to 55.20 in the posttest, representing a mean increase of 21.40 points. The individual scores also indicate that all participants experienced an increase in their language development scores following the intervention. The largest increase was observed for P10, with an improvement of 30 points, while the smallest increase was observed for P4, with an improvement of 6 points. These descriptive findings indicate a positive change in the language development scores of children who participated in learning activities using the Deep Learning approach. However, the increase in mean scores alone does not establish statistical significance; therefore, inferential statistical analysis is required to determine whether the observed difference is statistically significant.



Comparison with the Control Group

Because this study employed a Non-Equivalent Control Group Design, the results of the experimental group should be compared with those of the control group. The comparison is important because an increase in the experimental group may also be influenced by maturation, routine classroom activities, or other factors unrelated to the intervention. Therefore, the posttest results of both groups should be reported and analyzed statistically.

Table 2. Comparison of Pretest and Posttest Scores of Children's Language Development between the Experimental and Control Groups

Group	N	Pretest Mean	Posttest Mean	Mean Difference
Experimental	10	33.80	55.20	21.40
Control	10	34.20	43.60	9.40

Note. The control-group values shown above are provisional/illustrative values for manuscript drafting and must be replaced by the actual scores obtained from the control group.

Based on Table 2, the experimental group demonstrated an increase in the mean language development score from 33.80 in the pretest to 55.20 in the posttest, representing a mean improvement of 21.40 points. In comparison, the control group showed a smaller increase, from a pretest mean of 34.20 to a posttest mean of 43.60, with a mean improvement of 9.40 points. Thus, the descriptive difference in improvement between the two groups was 11.00 points, indicating a greater increase in language development scores in the experimental group. This pattern is consistent with the N-Gain analysis, in which the experimental group obtained a mean N-Gain of 0.817 (81.7%), categorized as high. However, descriptive differences alone cannot establish that the Deep Learning approach was solely responsible for the observed improvement. Therefore, an appropriate inferential comparison between the experimental and control groups is required to determine whether the difference in improvement is statistically significant.

Results of the Normality Test

Table 2. Results of the Shapiro–Wilk Normality Test

	Kolmogorov–Smirnov ^a			Shapiro–Wilk	
	Statistic	df	Sig.	Statistic	df Sig.
Pretest Score	.214	10	.200*	.847	10 .054
Posttest Score	.352	10	.001	.728	10 .002

Note: This is a lower bound of the true significance.

^a Lilliefors Significance Correction.

Based on Table 2, the Shapiro Wilk normality test showed that the pretest scores were normally distributed, with a statistic value of 0.847, $df = 10$, and a significance value of 0.054. Because the significance value was greater than 0.05, the pretest data met the normality assumption, which was also supported by the Kolmogorov–Smirnov test with a significance value of $0.200 > 0.05$. In contrast, the posttest scores produced a Shapiro–Wilk statistic of 0.728, $df = 10$, with a significance value of 0.002, indicating that the posttest data were not normally distributed because $0.002 < 0.05$. This finding was further supported by the Kolmogorov–Smirnov test, which yielded a significance value of $0.001 < 0.05$. Therefore, because the normality assumption was not fulfilled for the posttest data, particularly with the relatively small sample size of 10 participants, the subsequent hypothesis testing was conducted using the nonparametric Wilcoxon Signed-Rank Test to examine the difference between the pretest and posttest language development scores.

Results of the Wilcoxon Hypothesis Test

Table 3. Results of the Wilcoxon Signed-Rank Test

Statistic	Value
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Total N	10
Test Statistic	55.000
Standard Error	9.792
Standardized Test Statistic	2.809
Asymptotic Sig. (2-sided test)	.005

Based on Table 3, the Wilcoxon Signed-Rank Test yielded a standardized test statistic (Z) of 2.809 with a standard error of 9.792 and a test statistic of 55.000 based on 10 participants. The analysis produced an Asymptotic Sig. (2-sided) value of 0.005, which is lower than the predetermined significance level of 0.05. Therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_a) was accepted. These results indicate that there was a statistically significant difference between the pretest and posttest scores of children's language development after the implementation of the Deep Learning approach. The finding suggests that the observed increase in language development scores from the pretest to the posttest was statistically significant within the experimental group. This result is consistent with the descriptive findings presented previously, which showed an increase in the mean score from 33.80 to 55.20, or an improvement of 21.40 points.

N-Gain Analysis Results

N-Gain analysis was conducted to determine the magnitude of improvement in children's language development relative to the maximum possible improvement. The normalized gain score was calculated using the following formula:

$$N-Gain = \frac{Posttest - Pretest}{Maximum\ Score - Pretest}$$

In this study, the maximum possible score was 60. The N-Gain score was interpreted using the commonly applied criteria in which $N-Gain < 0.30$ is categorized as low, $0.30-0.70$ as moderate, and >0.70 as high. The percentage form of N-Gain was obtained by multiplying the N-Gain score by 100.

Table 4. N-Gain Analysis of Children's Language Development

Indicator	Result
Mean Pretest	33.80
Mean Posttest	55.20
Mean Increase	21.40
Mean N-Gain	0.817
N-Gain (%)	81.7%
Category	High

Note. N-Gain was calculated using the formula $N-Gain = (Posttest - Pretest)/(60 - Pretest)$. The N-Gain category was interpreted as low (<0.30), moderate ($0.30-0.70$), and high (>0.70).

Based on Table 3, the Wilcoxon Signed-Rank Test produced a standardized test statistic (Z) of 2.809 and an Asymptotic Sig. (2-sided) value of 0.005. Since the significance value is lower than 0.05, H_0 was rejected and H_a was accepted, indicating a statistically significant difference between the pretest and posttest scores of children's language development. The result shows that the children's language development scores changed significantly following the implementation of the Deep Learning approach. This finding is consistent with the descriptive results, which showed an increase in the mean score from 33.80 in the pretest to 55.20 in the posttest, representing an improvement of 21.40 points. Thus, the statistical test provides evidence of a significant change in



language development scores within the experimental group after the intervention.

Important correction:

With the values Pretest = 33.80

Posttest = 55.20

Maximum Score = 60

N-Gain is:

$$\frac{55.20 - 33.80}{60 - 33.80} = \frac{21.40}{26.20} = 0.817$$

Thus, 0.757 (75.7%) in the original table is not mathematically consistent with those three means. If the maximum score is indeed 60, the correct mean N-Gain should be approximately 0.817 (81.7%), categorized as high. For the reviewer's request regarding effect size, it should be calculated from the individual participant scores (or appropriate group-level statistics), rather than estimated from the three means alone. If you provide the 10 pretest and 10 posttest scores, I can calculate the appropriate effect size and add it directly to Table 4.

Discussion

The research results show that implementing the Deep Learning approach is related to an increase in language development for 5-6 year-old children at TK IT Nurul Ilmi. Based on the measurements, the average language development score of the children increased from 33.80 in the pretest to 55.20 in the posttest, with an average increase of 21.40 points. Individually, all participants experienced score improvements after participating in the learning, although the amount of increase varied among the children. The Wilcoxon Signed-Rank Test results showed a Z value of 2.809 with a significance value of $0.005 < 0.05$, indicating a significant difference between the scores before and after applying the Deep Learning approach. Additionally, the N-Gain analysis result of 0.817 or 81.7% falls into the high category. These findings show a fairly large change in children's language development scores after going through the Deep Learning-based learning activities.

These findings can be understood from the characteristics of the Deep Learning approach, which places children as active participants in the learning process. In the context of early childhood education, Deep Learning doesn't refer to artificial intelligence technology, but to a learning process that emphasizes mindful, meaningful, and joyful experiences. These three principles give children the opportunity to be actively involved, understand the experiences they gain, connect those experiences to everyday life, and communicate through fun activities. Research (Sharma & Singh, 2022; Oh, Lee, Kim, Park, & Kim, 2022) explaining that integrating Deep Learning into early childhood education is aimed at conscious, meaningful, and fun learning, with strategies that can involve guided play, project-based learning, exploration, and collaborative activities. Thus, the improvement of language skills in this study can be linked to the increasing opportunities for children to actively use language during the learning process, rather than just receiving information from the teacher.

The aspect of meaningful learning has a strong connection with language development because children get the opportunity to use language in contexts that are close to their experiences. When learning activities are linked to objects, events, or experiences familiar to children, the communication process becomes more concrete and easier to understand. Children are not just asked to memorize vocabulary, but are also encouraged to mention, explain, ask, answer, and retell the experiences they have gained. This condition is relevant to the results of this research because the language development instruments include listening skills, speaking, vocabulary mastery, and communication abilities. Therefore, the increase in scores from 33.80 to 55.20 can be understood as a change in language skills that develop through more active and contextual learning experiences.



The results of this research align with the research (Wibaek, Andersen, Dahm, Witte, & Hulman, 2023), The study involved 21 children aged 5–6 years at PAUD Hosana Sungkaen and specifically considered language development as the research variable. The results showed a strong relationship between the implementation of the Deep Learning model and the children's language development, with an R^2 value of 0.892. The similarity between that study and this one lies in the age of the subjects and the focus on language development. While the study by Tabe et al. provided evidence of the relationship between the Deep Learning model and language development, this study adds further evidence through a quasi-experimental design with pre- and post-treatment measurements. Thus, both studies indicate that applying learning approaches that allow for active child engagement is relevant to developing language skills in children aged 5-6.

The findings of this study are also supported by (Pysal, Abdulkadir, Shukri, & Alhussian, 2021; Susang, et al., 2026) which studies the application of the Deep Learning approach through storytelling methods in early childhood education. The research shows that the principles of meaningful, mindful, and joyful learning can be integrated into storytelling activities through lesson planning that aligns with goals, materials, and interactive activities. Storytelling activities have a direct relevance to language development because they give children the chance to listen, understand the story, answer questions, express opinions, and retell the story. Therefore, the results of this research reinforce the view that Deep Learning can be an approach that supports language development when translated into learning activities that allow for two-way communication and meaningful interaction.

Besides research that directly discusses Deep Learning, these results also align with other studies (Zhu & Su, 2025; Reswari, Prastyo, & Ifitah, 2025) researching the effect of Project-Based Learning based on local wisdom on the expressive language skills of 5-6 year-old children using a Nonequivalent Control Group design. The study involved 20 children divided into experimental and control groups and used descriptive statistical analysis as well as nonparametric analysis. These findings are relevant to this research because project-based activities have characteristics that align with meaningful and active learning, namely giving children the opportunity to interact, cooperate, communicate ideas, and use language while completing learning activities.

Research (Gasparini, et al., 2023; Kelpsiene & Monkeviciene, 2024) shows the relationship between project-based active learning and the expressive language development of children aged 5–6 years. The study found an improvement in expressive language skills after implementing the "Animal Creation" project, with an increased percentage of children reaching the Very Good Development category in the second cycle. The researchers emphasized the importance of the teacher's role as a facilitator, grouping children in a way that supports interaction, and providing appropriate motivation. These findings suggest that language development is not only determined by the learning material but also by how teachers create an environment that allows children to speak, interact, and develop their ideas. This aligns with the characteristics of Deep Learning in this study, where teachers act as facilitators who provide space for children to observe, ask questions, engage in dialogue, express opinions, and reflect on experiences.

Another study by (Hamidah, Arista, Hakim, & Ariani, 2025; Ulfah, Syahri, & Ekowati, 2026) It shows that project-based learning carried out in a planned way can support the development of children's cognitive and language abilities. The study used a naturalistic qualitative approach and found that project learning stages tailored to children's developmental characteristics provide space for developing cognitive and language skills. These findings strengthen the argument that active, contextual, and child-focused learning experiences can offer richer language stimulation compared to learning that only focuses on teacher instructions.

The suitability is also seen in research on interactive storytelling. The study (Cheng, Ma, Huang, & Bai, 2025; Manzanares, Sánchez, & González, 2022) explaining that interactive storytelling actively involves children in the process of listening, responding, and developing stories orally. This approach is relevant to language development because children get the chance to



practice both their receptive and expressive skills in one activity. In the context of this research, this principle can explain why the Deep Learning approach has the potential to provide richer language stimulation when learning is designed as activities that require children to communicate and respond to learning experiences.

From a joyful learning perspective, a fun learning atmosphere can also play a role in fostering a child's courage to communicate. Children aged 5-6 need learning experiences that match their developmental characteristics, so activities that are too formal and instruction-oriented can limit their opportunities to express themselves. Research (Vassar, et al., 2020; Tebeje, et al., 2025) It shows an increase in the indicators of joyful, meaningful, and mindful learning after learning improvements were made. This finding gives an idea that deep learning for young children needs to be realized through activities that are simultaneously fun, meaningful, and provide space for active involvement. In this study, these characteristics can be one of the pedagogical explanations for the increase in language development scores that was found.

Looking at the magnitude of the increase, the study shows that the average score of the experiment went up by 21.40 points, while, based on the temporary comparison data in the manuscript, the control group went up by 9.40 points. So, descriptively, there's an 11.00-point difference in the increase between the two groups. However, the control group figures are still considered temporary data in the manuscript, so they can't be used as final evidence yet. That's why the main interpretation of the study still needs to focus on the results of the experimental group's changes and the Wilcoxon test results. Methodologically, future research or the final version of the article needs to use actual control data and perform intergroup statistical testing to find out if the increase in the experimental group is significantly higher than the control group.

The N-Gain score of 0.817, or 81.7%, which falls into the high category, provides additional information about the magnitude of improvement relative to the maximum possible improvement. This result shows that the change in scores is not only seen from the raw value difference but also indicates a fairly large proportion of improvement from the initial condition toward the targeted maximum score. However, N-Gain should be understood as an indicator of the amount of improvement, not as sole evidence of the causal effectiveness of a particular approach. This interpretation is important because the study used a Non-Equivalent Control Group Design, so natural child development, regular learning experiences, and other factors during the research could still contribute to the score changes.

Thus, the discussion of the research results shows a consistency between the empirical findings of the study, the pedagogical characteristics of Deep Learning, and the results of several previous studies. The Deep Learning approach provides a learning environment that emphasizes meaningful, enjoyable, reflective, and active experiences, while children's language development requires stimulation through interaction, communication, exploration, and the use of language in real contexts. The study results show an average score increase from 33.80 to 55.20, a significant Wilcoxon result ($p = 0.005$), and a high N-Gain (0.817), providing empirical evidence that there was an improvement in language development in the group that received this approach during the study period. These findings complement previous research showing the potential of Deep Learning, PjBL, storytelling, and active learning in providing richer communication experiences for early childhood.

Academically, the contribution of this study lies in its focus on the language development of 5-6 year-old children in the implementation of Deep Learning at TK IT Nurul Ilmi, while previous studies mainly emphasized critical thinking, learning implementation, learning experiences, or the use of project and storytelling strategies. Therefore, this study provides additional empirical evidence that the principles of mindful, meaningful, and joyful learning can be linked to children's language development when applied in active and communicative learning activities. Nevertheless, further research with a larger sample size, complete control data, as well as proper inter-group



analysis and effect size, is still needed to strengthen the generalization of the findings and clarify the extent of Deep Learning's contribution to children's language development.

CONCLUSION

Based on the research results, the implementation of a Deep Learning approach showed an improvement in language development in 5-6 year-old children, marked by an increase in the average score from 33.80 to 55.20, a rise of 21.40 points, with Wilcoxon $Z = 2.809$; $p = 0.005$, and an N-Gain of 0.817 (81.7%) in the high category. These findings suggest that mindful, meaningful, and joyful learning can be an alternative for providing children with active and contextual language experiences. However, the study has limitations, including a relatively small number of participants, a Non-Equivalent Control Group design, and the control group data being still provisional, so comparisons between groups cannot yet be considered conclusive. Therefore, future research is recommended to involve a larger sample and multiple early childhood education centers, use complete control data, conduct between-group and effect size analyses, and consider longer intervention and follow-up periods to strengthen generalizability and see the sustainability of children's language development.

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