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The Utilization of Assistive Technology Based on Contextual Teaching Learning (CTL) for Children with Special Needs

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Abstract: This study aims to enhance teachers' understanding of the use of assistive technology based on Contextual Teaching Learning (CTL) for children with special needs. This is motivated by the limitations and skills of teachers in integrating assistive technology with the CTL approach, so the implementation has not been effective for their students. Additionally, many teachers have not received workshops or training related to assistive technology based on CTL. This research uses a quantitative approach with a One Group Pretest-Posttest experimental design. The sampling technique employed is saturated sampling, involving all subjects of the population, totaling 40 teachers from special schools in Pandeglang Regency. The instrument used in this study is a test in the form of a Guttman scale. The hypothesis test used is the Paired-Samples T Test. The data obtained are presented in the form of bar charts and statistical test tables. The results of hypothesis testing show $p<0.05$, which is significant. The average score before the test was 58.975, and after the treatment was applied, it increased to 90.825. Therefore, H1 is accepted, indicating a significant improvement, with the posttest scores being higher than the pretest scores. This result provides evidence that the actions taken in this study were effective in achieving the desired objectives.
Keywords: Assistive technology, contextual learning, children with special needs

Pemanfaatan Teknologi Asistif Berbasis Pembelajaran Kontekstual (Contextual Teaching Learning/CTL) untuk Anak Berkebutuhan Khusus

***Abstrak**: Penelitian ini bertujuan untuk meningkatkan pemahaman guru tentang penggunaan teknologi bantu berbasis Contextual Teaching Learning (CTL) untuk anak-anak berkebutuhan khusus. Hal ini dilatarbelakangi oleh keterbatasan dan keterampilan guru dalam mengintegrasikan teknologi bantu dengan pendekatan CTL, sehingga implementasinya belum efektif bagi siswa mereka. Selain itu, banyak guru yang belum menerima workshop atau pelatihan terkait teknologi bantu berbasis CTL. Penelitian ini menggunakan pendekatan kuantitatif dengan desain eksperimen One Group Pretest-Posttest. Teknik sampling yang digunakan adalah sampling jenuh, yang melibatkan seluruh subjek populasi, sebanyak 40 guru dari sekolah luar biasa di Kabupaten Pandeglang. Instrumen yang digunakan dalam penelitian ini adalah tes dalam bentuk skala Guttman. Uji hipotesis yang digunakan adalah Paired-Samples T Test. Data yang diperoleh disajikan dalam bentuk grafik batang dan tabel uji statistik. Hasil uji hipotesis menunjukkan $p<0,05$, yang signifikan. Rata-rata skor sebelum tes adalah 58,975, dan setelah perlakuan diberikan, meningkat menjadi 90,825. Oleh karena itu, H1 diterima, yang menunjukkan adanya peningkatan signifikan, dengan skor posttest lebih tinggi daripada skor pretest. Hasil ini memberikan bukti bahwa tindakan yang diambil dalam penelitian ini efektif dalam mencapai tujuan yang diinginkan.*
***Kata Kunci**: Teknologi asistif, pembelajaran kontekstual, anak berkebutuhan khusus*

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INTRODUCTION

Assistive technology is a tool or device that helps children with special needs overcome the barriers they face in carrying out their daily activities. Assistive technology is any item that enables individuals with disabilities to perform tasks that they otherwise could not do due to their impairments (Buehler et al, 2015). The appropriate use of assistive technology, tailored to the needs of children with special needs, can enhance the effectiveness of activities carried out by students. Teachers are not only required to be able to identify and implement assistive technology for each type of child with special needs, but they also need to develop their own ideas and creativity to create and/or modify assistive technology independently (Idhartono et al., 2024).

Moreover, assistive technology plays a vital role in improving performance and accommodating children with special needs. In special education, it serves as a strategy that enhances the quality of learning and provides easier accessibility for children to learn effectively and efficiently. Assistive technology also enables children to learn contextually through the Contextual Teaching and Learning (CTL) approach.

The CTL-based learning approach is a model where teachers connect knowledge with its application in real life. Students are encouraged to build their own knowledge through practices guided by the teacher, making them active and collaborative with their peers in solving problems. Contextual teaching and learning is a teaching and learning concept that helps teachers relate the material taught in the classroom to real-life situations of the students and encourages students to make connections between the knowledge they possess and its application in their lives as individuals, family members, and members of society (Mundilarto, 2004).

However, based on observations and interviews conducted with special education teachers in Pandeglang Regency, assistive technology based on CTL faces several challenges. The main challenge is the limited skills and knowledge in integrating assistive technology with the CTL approach, resulting in ineffective implementation for their students. Many teachers have not received workshops or training related to assistive technology based on CTL. Additionally, most of these teachers are not graduates of special education programs, meaning they are not well-versed in assistive technology based on CTL. This condition leads to an inadequately supported learning process for children with special needs. Based on these issues, the researcher applied a workshop for teachers on the use of assistive technology based on contextual learning for children with special needs. With the formulation of the hypothesis, whether the workshop on the Utilization of Assistive Technology Based on Contextual Teaching Learning (CTL) for Children with Special Needs can improve the understanding of special education teachers in Pandeglang Regency.

METHOD

There are two variables used in this study, namely the independent variable and the dependent variable. The independent variable in this study is the utilization of assistive technology based on contextual learning (Contextual Teaching Learning/CTL), while the dependent variable is children with special needs.

This study uses a quantitative research method. This quantitative study employs a One Group Pretest-Posttest experimental design. Below is a description of the research design.

Table 1. One Group Pretest-Posttest Design

O_1 X O_2

Description:
O_1 = Pretest (Before treatment is applied)
X = Treatment
O_2 = Posttest (After treatment is applied)

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This design is commonly used to assess the effect of a treatment or intervention by comparing the participants' performance before and after the treatment.

The sampling technique used in this study is saturated sampling, as stated by Sugiyono (as cited in Rosadi, 2020). Saturated sampling is a technique for determining a sample when all members of the population are used as the sample. This study involves all 40 teachers from Pandeglang Regency who attended the workshop located at SKH Algisyafa. The instrument used in this study is a test through the Guttman scale. The test is designed to measure the teachers' level of understanding. The Guttman scale provides clear responses, either "Yes" or "No," making it easier to measure the pretest and posttest results. The hypothesis test used is the Paired-Samples T Test Data analysis was conducted using statistical tools in Excel and Python. This analysis aims to test the hypothesis to determine if there is a significant difference between the pretest scores (before the workshop) and the posttest scores (after the workshop).

RESULT AND DISCUSSION

Result

The data from the study were obtained from the pretest and posttest scores to measure the teachers' level of understanding. The data obtained are illustrated in the following bar chart:

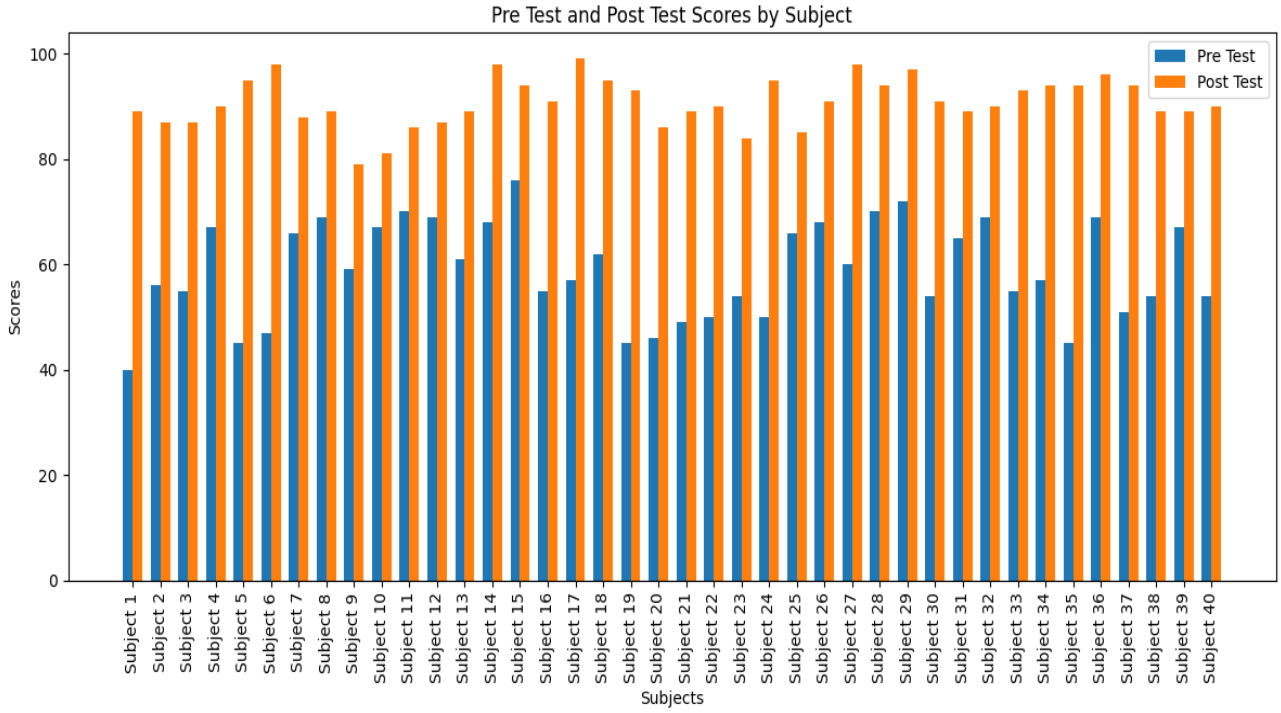

Figure 1. Scores of Teachers' Understanding Level: Pretest and Posttest

From the figure, the data obtained showed that the lowest pretest score was 40, and the highest pretest score was 76. After the treatment, the lowest posttest score was 79, and the highest posttest score was 99.

After obtaining the pretest and posttest data, hypothesis testing was conducted. The data obtained from the pretest and posttest were then analyzed using the Paired-Samples T Test.

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Table 2 t-Test: Paired Two Sample for Means

	Pre-Test	**Post-Test**
Mean	58,975	90,825
Variance	86,025	21,53269231
Observations	40	40
Pearson Correlation	-0,062063662	
Hypothesized Mean Difference	0	
df	39	
t Stat	-18,95799749	
P(T<=t) one-tail	1,3907E-21	
t Critical one-tail	1,684875122	
P(T<=t) two-tail	2,78141E-21	
t Critical two-tail	2,022690901	

Based on the results of the Paired Two Sample for Means t-test, here is an explanation of the data:

Pretest: The average score before the test was 58.975, with a variance of 86.025. A total of 40 teachers were tested. Posttest: The average score after the test increased to 90.825, while the variance significantly decreased to 21.53269231. A total of 40 teachers were tested.

In the Pearson correlation test, a value of -0.062 was found, indicating a very weak negative relationship between the data before and after the test.

The results of the test show that the t-statistic is -18.96, which is much smaller than the t-critical two-tail value of 2.02, with a very small P-value **(**2.78141E-21**).** This indicates that there is a highly significant difference between the pretest and posttest scores. In this case, the very low P-value strongly rejects the null hypothesis (which states there is no difference between the pretest and posttest).

Thus, it can be concluded that there is a significant improvement in the average posttest scores compared to the pretest, indicating that the treatment applied between the two tests had a significant effect.

Discussion

The implementation of an assistive technology workshop based on contextual learning has been proven to significantly enhance the understanding of special education teachers in Pandeglang Regency (ABK). The assistive technology workshop that was introduced consists of various tools and devices designed to help children with special needs overcome learning barriers, enabling them to participate optimally in the educational environment. This finding strengthens the Contextual Teaching and Learning (CTL) theory proposed by Johnson (2002), which states that the CTL approach can help students and teachers connect theory with practical applications oriented toward real-life situations. Moreover, this result aligns with the study conducted by Garcia & Ruiz (2018), which revealed that the application of technology in experience-based learning can improve accessibility and independence for students with special needs. Research conducted by Smith et al. (2021) states that technology-based training can enhance teachers' skills in utilizing assistive technology devices to support the learning process of students with special needs. Additionally, Edyburn (2021) asserts that integrating technology into inclusive classrooms can enhance learning effectiveness by providing better accessibility to

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lesson materials for students. This is similar to Bouck's (2016) findings, which state that assistive technology plays a crucial role in increasing independence in academic tasks and communication for students with special needs.

Another study conducted by Flanagan et al. (2013) also suggests that CTL-based learning can help teachers improve hands-on practice skills in using assistive technology. Meanwhile, Blackhurst (2005) emphasizes that the effectiveness of assistive technology depends on teachers' readiness to use the tools, along with adequate support from the school environment.

Observations during the training showed that teachers became more confident in using assistive technology in the teaching and learning process. Before the workshop began, most teachers stated that they had difficulty understanding the optimal use of assistive technology. After attending the workshop, the majority of participants expressed that they felt more prepared and would be able to integrate assistive technology into their teaching process. These results support the Universal Design for Learning (UDL) theory developed by Rose et al. (2002), which suggests that flexibility in the use of technology can enhance learning effectiveness for students with special needs. Research by Alnahdi (2020) also states that teacher training in assistive technology can contribute to increased confidence in using technological aids to support learning. This is also supported by the findings of Parette & Scherer (2004), who emphasized that the effective use of assistive technology in inclusive education requires comprehensive training for all teachers.

Research by McLeskey et al. (2021) found that teachers who receive continuous technology training are more capable of integrating assistive technology into the learning curriculum. This indicates that the training provided has a positive impact on teachers' readiness to utilize CTL-based assistive technology.

Based on the research findings, several important implications can be applied in the field of education:

1. Workshop Curriculum Development: The results of this study indicate that CTL-based teacher training can enhance teachers' understanding of assistive technology. Therefore, teacher workshop programs should adopt a CTL approach with hands-on practice in using technology in teaching.
2. Increased Access to Assistive Technology: The government and educational institutions must ensure that inclusive schools have access to technology that supports the learning of students with special needs.
3. Research Expansion: Further studies can be conducted to examine the long-term effectiveness of assistive technology and measure its impact on the learning outcomes of students with special needs.

These challenges are also reflected in the study conducted by Okolo & Diedrich (2022), which reveals that although assistive technology holds great potential for improving educational accessibility, resource limitations often hinder its implementation. Therefore, strategies to enhance schools' capacity in providing technology and additional training for teachers are necessary.

CONCLUSION

The results of the study indicate that the implementation of the workshop on the Utilization of Assistive Technology Based on Contextual Teaching Learning (CTL) for Children with Special Needs can improve the understanding of special education teachers in Pandeglang Regency. This can be seen from the scores obtained before and after the treatment. Based on hypothesis testing, the result showed $p<0.05$, specifically 1,3907E-21. Therefore, H1 is accepted, and there is a significant improvement, with the posttest scores being higher than the pretest scores. This result provides evidence that the actions taken in this study were effective in achieving the intended goals.

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