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The Influence of Universal Design for Learning (UDL) on the Learning Outcomes of IPAS Students in Inclusive Classes

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Abstract

Education is a fundamental right for all students, including students with special needs (PDBK). *Universal Design for Learning* (UDL) is a learning design that can be used to design learning so that all students can benefit from it. In this study, the method used was an experimental method with a control group and an experimental group. The experimental group received learning using UDL, while the control group used conventional methods. Three-factor analysis of variance with repeated measurements was used to evaluate the differences between pretest and posttest in the development of lesson plans that are accessible to all students. The results showed that the application of UDL significantly improved learning outcomes for students in inclusive classrooms. In conclusion, the application of UDL can improve learning outcomes for students in inclusive classrooms, although further training is needed for teachers to optimize the application of UDL, and cooperation from various parties is needed to create an educational climate that is suitable for students with special needs.

Keywords: UDL, learning outcomes, inclusive classroom students

Abstrak

Pendidikan merupakan hak dasar bagi seluruh peserta didik, tidak terkecuali peseta didik berkebutuhan khusus (PDBK). *Universal Design for Learning* (UDL) merupakan suatu desain pembelajaran yang dapat merancang pembelajaran sehingga pembelajaran dapat dirasakan oleh semua peserta didik. Pada penelitian ini, metode yang digunakan adalah metode eksperimen dengan kelompok kontrol dan kelompok eksperimen. Di mana kelompok eksperimen menerima pembelejaran menggunakan UDL sementara kelompok kontrol menggunakan metode konvensional. Analisis varian tiga faktor dengan pengukuran berulang digunakan untuk mengevaluasi perbedaan antara pretest dan posttest dalam pengembangan rencana pelajaran yang dapat diakses oleh semua siswa. Hasil penelitian menunjukkan bahwa penerapan UDL secara signifikan meningkatkan hasil belajar bagi peserta didik kelas inklusi. Kesimpulannya, penerapan UDL dapat meningkatkan hasil belajar bagi peserta didik kelas inklusi, meskipun diperlukan pelatihan lebih lanjut bagi guru untuk mengoptimalkan penerapan UDL serta dibutuhkan kerja sama dari berbagai pihak untuk dapat menciptakan iklim pendidikan yang sesuai bagi peserta didik berkebutuhan khusus.

Keywords: UDL, hasil belajar, peserta didik kelas inklusi

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INTRODUCTION

Inclusive education is a priority in the global education sector, and Indonesia is no exception. The government continues to make efforts to improve the quality of learning in Indonesia. Through Permendiknas Number 70 of 2009, it is stated that inclusive education is an education system that provides opportunities for all people with disabilities, intellectual potential, and special talents to participate in learning together with general students (Khotimah, 2019) . The principles of inclusive education are also outlined by (Farah et al., 2022) . The main principle of inclusive education is that every student can learn and turn their differences into their greatest potential. One of the basic principles of inclusive education is that students with special needs must be present in the classroom to enable them to participate and be accepted in the educational unit (David Wijaya, 2019) . Therefore, every educational unit must provide the same educational services to all students, both those without special needs and those with special needs.

However, policies regarding inclusive education services in Indonesia have not been fully implemented. According to a 2019 UNICEF study, approximately 0.8% of school-aged children (7-18 years old) in Indonesia, or around 460,000 children, have been identified as having disabilities(Lismaniar et al., 2021) . These children with disabilities face many difficulties and challenges in accessing education (UNICEF, 2020) . This shows that, in general, students with special needs in Indonesia still experience difficulties in accessing education, which has an impact on their learning outcomes (Ningrum, 2022) .

These barriers to learning access have an impact on the learning outcomes of students in inclusive classes. In general, learning outcomes in Indonesia are still not optimal. This is shown by the results of the assessment conducted by PISA (*Programme for International Student Assessment*) by *the Organisation for Economic Cooperation and Development* (OECD) in 2022. Indonesia's PISA scores show that mathematics scored 366, reading 359, and science 383. In science, Indonesia ranked 67th out of 72 countries with a score of 383. This score indicates that the score obtained is still below the OECD average of 485 points. This shows that science learning outcomes in Indonesia are still low(., 2024) .

Based on the 2023 Education Report Card for SDN Johar Baru 15, the school received a score of 55.3 for inclusivity, which is in the middle category. Meanwhile, for disability services, the school received a score in the good category but experienced a decline of 4.96% from the previous year. The number of students with special needs at SDN Johar Baru 15 is quite high. In a school consisting of 342 students, there are 41 students categorized as students with special needs.

In grade V, there are two classes, namely class VA and VB. The total number of students in classes VA and VB is 52 students. Each class consists of 26 students. In class VA, there are 7 students or 27% of students with special needs in the slow learner category, and in class VB, there are 7 students or 27% of students with special needs in the slow learner category. Their average IQ scores range from 70 to 90. The problems that arise in Grade 5 at SDN Johar Baru 15 are: 1) Based on the summative assessment from the first semester, the average IPAS learning scores of 56 students in classes VA and VB show that 36 students or 64% have not completed the KKTP. Only 20 students or 36% achieved mastery. The KKTP for IPAS subjects is 70. 2) Slow learners in grade 5 at SDN Johar Baru 15 have a short attention span, so continuous repetition is necessary. 3) PDBK accessibility is lacking in learning, resulting in passivity and a lack of motivation in learning. Therefore, improvements are needed for students in inclusive classes. 4) There is a lack of IT-based learning media development that can increase participation for students in inclusive classes.

Based on observations and interviews in class V of SDN Johar Baru 15 related to students in inclusive classes, there is a need to improve learning by applying learning designs and media that can provide accessibility to both non-PDBK and PDBK students, thereby improving student learning outcomes, especially in IPAS learning.

This study was based on the urgent need to address the challenges faced by students with special needs in grade V of SDN Johar Baru 15 in relation to learning outcomes. The lack of equality in learning caused students with special needs in grade V of SDN Johar Baru 15 to have difficulties in following lessons, from the use of media to participating in lessons and during evaluations.

Previous research conducted by the explains that through UDL, which emphasizes flexibility in teaching, every student, regardless of background, ability, or learning style, can access and engage in learning effectively. UDL focuses on developing strategies that can be adapted to the diverse needs and characteristics of students, whether in terms of background, ability, or learning style. By providing various options in delivering material, students can access information in the way that suits them best, whether through text, images, audio, or other media. This approach allows every student, including those with special needs, to more easily understand the material being taught, thereby improving the quality of learning in diverse classrooms.

Furthermore, Muslim's (2022) research also reveals that the flexibility offered by UDL not only impacts access to materials but also student engagement in the learning process. UDL provides variety in teaching and assessment methods, allowing students to actively participate in learning according to their strengths. This leads to increased student motivation and interest in learning, as they feel more valued and can interact with learning materials in ways that are more relevant to them. Overall, UDL encourages the creation of a more inclusive and adaptive learning environment, which allows each student to develop optimally, regardless of the differences between them.

In its application, there are three principles in UDL, namely (1) *Multiple Means of Engagement*, which is an effort to increase student engagement to support affective learning through stimuli that spark students' interest and motivation; (2) *Multiple Means of* Representation, which provides various representative means to support meaningful learning; (3) *Multiple Means of* Action and Expression, which provides various means of action and expression as an effort to support alternative strategic learning methods for learners to demonstrate what they know. The main principles in UDL will enable educators to design learning with varied objectives, methods, media, learning materials, and assessments based on the needs tailored to the characteristics of learners with special needs(Cressey, 2020) .

In its application, *Universal Design for Learning* (UDL) promotes three main principles designed to support an inclusive and effective learning process. The first principle, Multiple Means of Engagement, focuses on efforts to increase student engagement by providing stimuli that motivate and attract their interest in learning. This principle emphasizes the importance of creating learning experiences that are enjoyable and relevant to students, so that they become more emotionally and cognitively engaged. As a result, students will be more motivated to actively participate in each stage of learning, which in turn will improve their learning outcomes.

The second principle, Multiple Means of Representation, emphasizes providing various ways of presenting information or learning materials. This aims to ensure that all students can access and understand learning materials in a way that suits their learning styles. For example, materials can be delivered through text, images, videos, or live demonstrations, which provide opportunities for students with various abilities to gain a deeper understanding. The third principle, Multiple Means of Action and Expression, provides various ways for students to express and demonstrate their understanding, whether through writing, oral presentations, or other forms of expression. By providing alternatives in action and expression, this principle allows each student to choose the most comfortable and effective way for them to demonstrate the knowledge they have learned. These principles collectively enable educators to design more flexible learning experiences tailored to the characteristics and needs of each student, particularly those in inclusive classrooms (Cressey, 2020).

The urgency of this research lies in the importance of finding effective solutions to improve learning outcomes for students in inclusive classrooms. As the number of students with disabilities enrolled at various levels of education increases, the challenge of providing equitable and inclusive education becomes even greater (Suryadi, 2023) . Many students with special needs face difficulties in accessing learning materials optimally, which has the potential to hinder their learning process(Ndek et al., 2023) . Therefore, it is very important to develop and implement teaching strategies that can be adapted to the diverse needs of students in inclusive classrooms, ensuring that all students can access and understand the subject matter in a way that suits their abilities.

Universal Design for Learning (UDL) is an approach that can meet these needs by providing a flexible and adaptable framework for various types of learning (Novianti, 2021) . With the basic principle of providing various ways to access information, interact with learning materials, and express understanding, UDL focuses on empowering each student according to their strengths and needs(Suprihatiningrum et al., 2021) . This approach is highly relevant in the context of inclusive education, as it provides space for adjustments that can improve accessibility and learning outcomes for students, both for those with disabilities and those without learning barriers(Phytanza et al., 2022) . Through this research, it is hoped that effective ways of implementing web-based interactive multimedia-assisted UDL to support the success of inclusive education can be identified.The research problem is how UDL can be effectively applied to improve learning outcomes, especially in science lessons for students in inclusive classrooms. The alternative solutions that have been identified include the use of technology to support UDL principles, such as representation, engagement, and action and expression. The solution chosen in this study is the application of UDL in developing lesson plans and evaluating its effectiveness in improving accessibility and learning outcomes for students with special needs.

The novelty of this study lies in its focus on integrating the *Universal Design for Learning* (UDL) approach to improve the learning outcomes of students in inclusive classrooms, by examining its impact at various levels of education. This study not only examines theories related to UDL, but also assesses its implementation in the practical context of inclusive classrooms, which have a diversity of students with various needs and abilities. Thus, this study provides new insights into how UDL can be adapted and applied to achieve more optimal results in inclusive learning environments. In addition, this study also aims to identify the challenges and obstacles that educators may face in implementing UDL, as well as to find solutions to overcome these obstacles.

The main objective of this study is to thoroughly evaluate the impact of UDL on the accessibility of learning for students with special needs, as well as how this approach can support their learning process more effectively. This study also aims to provide practical recommendations for teachers and educators on more effective ways to implement UDL in inclusive classrooms. By providing evidence-based guidance and field experience, this study is expected to help educators design learning that is more flexible, responsive to student needs, and encourages the creation of a more inclusive and participatory learning environment.

RESEARCH METHOD

This study uses a quantitative method with a pre-experimental design because the researcher did not use control variables, and the sample was not selected randomly. This study uses a quantitative method with a pre-experimental design because it aims to measure the effect of a specific treatment, namely the implementation of Universal Design for Learning (UDL), on student learning outcomes without involving a control group for comparison (. A pre-experimental design was used because the researchers did not apply randomization in sample selection but instead used the entire population of inclusive class students (saturated sample) totaling 52 students. Although it does not have control variables, this design still provides an initial picture of the effect of UDL intervention on improving the learning outcomes of

inclusive class students. The results can serve as a basis for further research with more complex designs, such as true experiments.

The pre-experimental approach used is *a one-shot case study*. In this study, there is a group that is given treatment, followed by observation to determine the results (Sugiyono, 2020) . The pre-experimental approach with a one-shot case study design is used in this study to evaluate the impact of implementing *Universal Design for Learning* (UDL) on the learning outcomes of students in inclusive classes. In this design, there is one group of students who are given treatment in the form of UDL-based learning without a control group for comparison. After the treatment was given, observations were made of the group through learning outcome measurements (*posttest*) to determine the impact of UDL implementation. Although this design is simple and prone to threats to internal validity, such as the absence of a comparison group or initial measurements (pretest), this approach still provides preliminary information about the effectiveness of UDL intervention in the context of inclusive classrooms.

Therefore, this study will compare the level of accessibility of students with special needs before and after the implementation of *Universal Design for Learning* (UDL). The research subjects consisted of 52 fifth-grade students at SDN Johar Baru 15, with 26 students from class VA and 26 students from class VB. Of these, 14 PDBK students were categorized as *slow learners*.

Subject selection was conducted using saturated sampling, in which all members of the population were included in the sample (Rahim, 2021) . Subject selection in this study was conducted using saturated sampling, in which all members of the population were included in the research sample. This technique was used because the population size was relatively small and could be included in its entirety, eliminating the need for random sample selection. In the context of this study, the population consisted of 52 students in an inclusive classroom, all of whom were involved to ensure that the research results covered all the characteristics of the population. This approach aimed to obtain a more comprehensive picture of the effect of *Universal Design for Learning* (UDL) on student learning outcomes in an inclusive classroom environment without leaving out any relevant subjects.

The research procedure began with the collection of preliminary data in the form of observations and tests. Pre-tests and post-tests were conducted to assess learning outcomes in science before the UDL intervention was implemented. Next, the UDL intervention will be implemented in the form of curriculum modifications and teaching methods in accordance with UDL principles, such as providing various means of representation, action, and expression, as well as student engagement. After the intervention, data will be collected again to measure changes in student accessibility and engagement in learning.

The research procedure began with the collection of initial data through observation and the administration of a pretest to measure student learning outcomes prior to the implementation of Universal Design for Learning (UDL). The purpose of this pretest was to determine students' initial level of understanding of IPAS material in learning without intervention. Observations were conducted to identify the specific obstacles and needs of students in inclusive classes so that the intervention could be designed according to their characteristics. This initial data serves as a basis for comparing learning outcomes before and after the implementation of UDL.

Next, UDL intervention was implemented through curriculum modification and teaching methods based on UDL principles. These principles include providing various means of representation to help students understand the material, various forms of action and expression to demonstrate understanding, and engagement strategies that can increase student motivation to learn. After the intervention was implemented, posttest data were collected to evaluate student learning outcomes. In addition, observations were conducted again to measure changes in student accessibility and engagement during UDL-based learning. The results of the pretest and posttest were compared to assess the effectiveness of UDL implementation in improving the learning outcomes and accessibility of students in inclusive classrooms.

The instruments used in this study included questionnaires to measure students' perceptions of learning accessibility, classroom observations to assess student engagement, and academic tests to measure student learning outcomes before and after the intervention. The data analysis technique used was the *One Samples T-Test* comparison test. The *one-sample t-test* is a statistical method used to test how significant the mean of a sample is to the population mean (Syafriani et al., 2023) . The data analysis technique was chosen to compare data before and after the intervention, as well as to identify the significant effects of UDL implementation on learning outcomes.

The research instruments used included three main tools to collect relevant data. Questionnaires were used to measure students' perceptions of learning accessibility, particularly in relation to how they felt helped by the principles *of Universal Design for Learning* (UDL). Classroom observations were conducted to assess the level of student engagement during the UDL-based learning process, focusing on interaction, active participation, and student responses to the material presented. In addition, academic tests were administered before (pretest) and after (posttest) the intervention to objectively measure changes in student learning outcomes. The combination of these three instruments enabled the comprehensive collection of data on the impact of UDL on student accessibility, engagement, and learning outcomes.

To analyze the data, the One Samples T-Test was used, a statistical method that tests whether the sample mean differs significantly from a specific mean value (Syafriani et al., 2023) . This technique was used to compare the pretest and posttest results in order to identify the significant effect of UDL implementation on student learning outcomes. By comparing the average learning outcomes before and after the intervention, this test helps determine whether the changes that occurred were significant enough to support the research hypothesis. The selection of this test was appropriate because it provided strong analysis results for quantitative data, especially in pre-experimental research designs such as those used in this study.

RESULTS AND DISCUSSION

The initial data used in this study was pre-test data collected from students before they received treatment and used conventional learning methods. The pre-test was conducted by 52 students in an inclusive class to measure their level of understanding of the Social Science (IPAS) subject matter. The purpose of this pre-test was to collect data related to student learning outcomes before the application of a specific teaching method, as a basis for determining the initial level of understanding of the subject matter taught.

The results of the pre-test data analysis show that the IPAS learning scores in inclusive classes are still low, with most students not yet reaching the expected standards. These findings reveal that of the 52 students who took the pre-test, 34 students showed low learning outcomes. This indicates that the conventional learning approach used previously has not been effective in improving student understanding, especially for students with special needs. Therefore, these results emphasize the importance of developing more inclusive and adaptable learning methods to meet the diverse needs of students in inclusive classrooms.

Table 1. Frequency Distribution of Pre-test and Post-test Learning Outcomes Score Category

Score	Pre-test (f)	Pre-test (%)	Posttest (f)	Posttest (%)
40-49	15	28.8	0	0
50-59	20	38.5	8	15.4
60-69	10	19.2	15	28.8
70-79	5	9.6	20	38.5
80-89	2	3.8	9	17.3
Total	**52**	**100**	**52**	**100**

From the data listed in the table, it can be seen that the students' pre-test results were mostly in the low score category, namely in the score range of 50-59 (38.5%) and 40-49 (28.8%). This indicates that prior to the implementation of the Universal Design for Learning (UDL) approach, most students in the inclusive classroom had not yet achieved an optimal level of understanding of the science material. This condition highlights the need for a more effective and inclusive learning approach to help students, especially those with special needs, improve their learning outcomes.

After implementing UDL, post-test results showed a significant improvement in student learning outcomes. The majority of students are now in the 70-79 (38.5%) and 60-69 (28.8%) score categories, which indicates a clear improvement compared to the pre-test results. This improvement shows that the UDL approach, which provides flexibility in how material is delivered and offers variety in learning methods, has been successful in supporting students' understanding more effectively (Rosmi & Jauhari, 2023) . This also indicates that this approach can improve accessibility and learning outcomes for students in inclusive classrooms, making it more effective in meeting the diverse needs of learners(Lintangsari et al., 2023) . This improvement shows that UDL has a positive effect on the learning outcomes of students in inclusive classrooms. UDL principles, such as providing various forms of material presentation, varying student engagement, and flexible assessment methods, help improve student accessibility and understanding of IPAS material. This is in line with previous research showing that UDL can increase student engagement in learning, especially in inclusive classrooms consisting of students with diverse learning needs.

The table presents a distribution table that illustrates the results of the collected data. To facilitate understanding and analysis, the distribution table is then presented in a bar chart that provides a clearer visual representation of the distribution of scores obtained by students. This bar chart provides an easier-to-understand overview of the distribution of student learning outcomes on the pre-test and post-test, as well as making it easier to see the significant changes that occurred after the implementation of the Universal Design for Learning (UDL) approach. Thus, this bar chart is expected to help interpret the data more efficiently and facilitate the identification of trends or patterns in student learning outcomes.

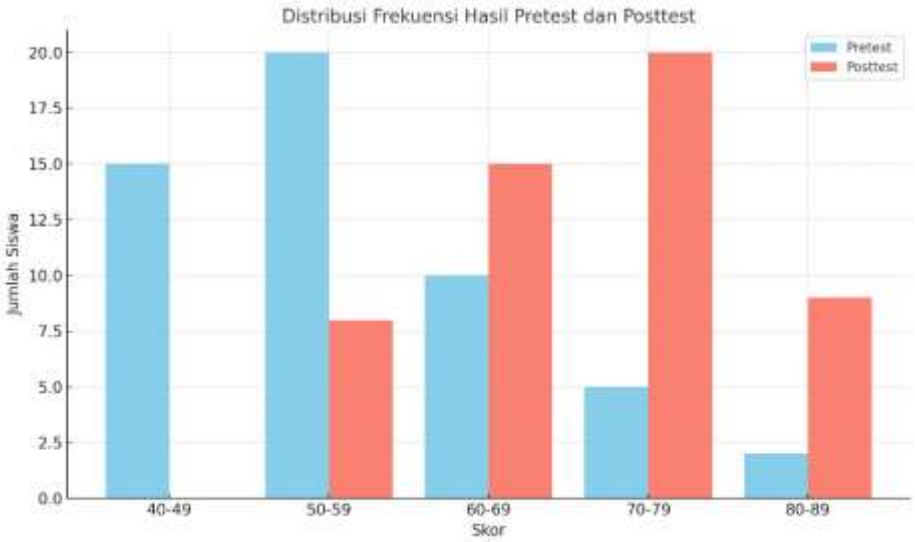

Figure 1. Frequency Distribution of Pretest and Posttest Results

The bar chart above shows a comparison of the frequency distribution of students' pre-test and post-test results after the implementation of the *Universal Design for Learning* (UDL) approach. The chart shows a significant change in student learning outcomes, with most students who were previously in the low score category on the pre-test now showing improvement on the post-test. This improvement is evident in the decrease in the number of students in the low score category and the increase in the number of students in the medium to

high score categories. This shows that UDL has had a positive impact on improving students' understanding and abilities.

The implementation of UDL as a flexible learning approach tailored to individual student needs has proven effective in improving their learning outcomes. In the diagram, the medium to high score categories show a significant increase, with the majority of students now in the 60-79 score category on the post-test. This improvement indicates that the UDL approach, which provides various ways to access material and express understanding, has succeeded in helping students understand the material better, regardless of their different abilities. Thus, the implementation of UDL not only improves overall learning outcomes but also creates a more inclusive and responsive learning environment for the needs of each student.

CONCLUSION

The conclusion of this study shows that there is a positive effect of implementing *Universal Design for Learning* (UDL) on student learning outcomes in inclusive classrooms, particularly in Social Sciences (IPAS) subjects. Based on the data listed in the table, the pre-test results show that most students were in the low score category, indicating that conventional learning methods were not effective enough in meeting the needs of students, especially those with disabilities. However, after the implementation of UDL, the post-test results showed a significant improvement, with the majority of students in the medium to high score category. This improvement shows that UDL has succeeded in providing more inclusive and flexible learning, in line with the diverse needs of students.

The application of UDL principles, such as providing various ways of presenting material, varying student engagement methods, and more flexible assessment, has proven effective in improving students' understanding of IPAS material. These results are in line with previous studies showing that UDL can increase student engagement and learning outcomes, especially in inclusive classrooms involving students with various learning needs. Thus, UDL not only helps students access material in a way that is more suited to their abilities, but also creates a more effective and responsive learning environment for diversity in inclusive classrooms.

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