

## ADAPTIVE LEARNING DESIGN FOR EARLY CHILDHOOD WITH DIVERSE ABILITIES (INCLUSIVE EDUCATION)

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**Abstract:** This research aims to examine the application of adaptive learning design in supporting inclusive education for young children with diverse abilities. The method used was descriptive-qualitative with a literature review, which identified three main aspects supporting the adaptive approach's success. The findings show that three main aspects support the success of the adaptive approach. 1) The diversity of early childhood needs requires the implementation of learning that is tailored to individual characteristics, such as visual, auditory, or kinesthetic learning styles. 2) Teachers play an important role in creating an inclusive learning environment by understanding the uniqueness of each child and customizing appropriate learning strategies. In addition, collaboration between teachers, parents, and the community is also an important factor in meeting children's needs holistically. The teacher's role as a facilitator and liaison between students, families, and other professionals is crucial. 3) The use of media and technology, such as educational apps and interactive software, can enrich the learning experience and create a dynamic and inclusive environment. Through the implementation of adaptive learning design that involves various parties and modern technology, inclusive education can be implemented effectively, providing optimal opportunities for children to develop accordingly.

**Keywords:** Adaptive learning design, early childhood, diverse abilities.

### Introduction

Early childhood education is an important foundation in individual development, where children begin to build cognitive, social, emotional and motor abilities that will support them in the next stage of life (Khadijah & Jf, 2021; Rahimah, 2021). In the early years, children show a wide diversity of abilities, both related to natural development and special needs. Inclusive education, which seeks to create a learning environment that supports children with a wide range of abilities, is one important approach to accommodating these needs (Lestarinigrum, 2017; Mulyadi & Kresnawaty, 2020).

In the context of inclusive education, adaptive learning design emerges as a strategic solution to address these diversity challenges. Quoted through the UNESA website (2024), the adaptive approach is an innovative approach in the world of education that allows learning experiences that are tailored to their individual needs. In today's digitalization era, the adaptive learning approach becomes more effective because it can utilize various media/tools to assess individual student abilities, besides adaptive learning does not only teach material in general, but about providing experiences that are relevant and in accordance with the learning speed of each student (Buaton & Yel, 2022).

This explains that an adaptive design learning approach allows teachers to customize learning methods, media and strategies according to the unique needs of each child, including children with special needs such as autism spectrum disorders, speech delays or learning difficulties. Moreover, adaptive learning design not only supports children with special needs but also benefits children without special needs by creating a rich and varied learning

environment (Kurniawati et al., 2021; Pendidikan, 2024). Thus, the application of adaptive learning allows children with special needs to develop optimally, while other children also learn to appreciate diversity through values such as tolerance, empathy and cooperation.

Previous research has shown that early intervention based on adaptive approaches positively impacts early childhood development tailored to their needs. Boiliu & Messakh (2024) adaptive learning can increase young children's interest, motivation, and learning ability by providing learning experiences tailored to their needs. In addition, adaptive technology integrated into learning design is effective in increasing children's engagement in the learning process. However, many studies have proven the effectiveness of this approach, the implementation of this adaptive learning design in several early childhood education institutions still experiences various challenges such as the lack of training for teachers, limitations in providing resources, and less than optimal policy support available.

Based on the description above, the author is interested in studying in more depth by taking the research title, "Adaptive Learning Design for Early Childhood with Diverse Abilities (Inclusive Education)".

## Literature Review

### 1. Inclusive Education for Early Childhood

Inclusive education for early childhood is a very important approach in the development of fair and equal education (Harfiani & Setiawan, 2019). According to Heldanita (2018), inclusive education should start early to optimize children's potential, regardless of their economic background or physical, mental and social conditions. This approach emphasizes the importance of early stimulation as the foundation for children's optimal development, so all children deserve access to quality education.

In the Indonesian context, recent research shows that inclusive learning management in Early Childhood Education (ECED) institutions involves integrated planning and evaluation that takes into account the specific needs of each student (Pangestuti & Darsinah, 2023). This creates a supportive learning environment for both children with special needs and regular children.

However, challenges in implementing inclusive education still exist. Research shows that teachers' lack of knowledge and skills in dealing with children with special needs is a major barrier (Muttaqien, 2023). Therefore, teacher training as well as raising awareness of the importance of diversity in the classroom is necessary to ensure the success of inclusive education programs in Indonesia.

### 2. Adaptive Learning Design

Learning activities are the core of the educational process, where there is a transmission and transformation of learning experiences to students based on the applicable curriculum. In its implementation, improving the quality of learning is needed to be in line with the needs of the digital era in the 21st century (Kholis, 2024). Therefore, a learning design is needed that is able to comprehensively accommodate learning principles, such as student-oriented, learning through hands-on practice (learning by doing), development of social skills, curiosity, imagination, creativity, and skills in solving problems.

Adaptive learning is an approach that allows learners to learn material according to their individual abilities (Kholis, 2024). It differs from traditional approaches which often assume that all learners have equal abilities. In adaptive learning, technology is utilized to customize learning materials based on the needs of each student. The adaptive learning system uses algorithms to evaluate learners' abilities and adjust the materials accordingly.

In this method, the teacher plays an active role in assisting learners to understand difficult concepts. The teacher also responds to verbal and nonverbal cues from learners, adjusts the flow of learning to answer questions or overcome prolonged confusion, and changes activities based on learners' interests or needs. For example, if students face difficulties, teachers provide direct guidance instead of asking them to complete the task independently. This approach is designed to create a more effective learning experience that suits individual needs.

### 3. Benefits and Challenges of Adaptive Learning in Inclusive Education

Adaptive learning in its application to inclusive education is similar to other learning approaches or methods. Adaptive learning also provides its own benefits and challenges in the context of inclusive education. Some of the benefits include (Kholis, 2024):

- a. Customization of learning materials: This method allows every student, including those with special needs, to learn the material according to their individual ability level and learning pace.
- b. Increased student engagement: With a customized approach, learning becomes more interesting and relevant, thus increasing student motivation and participation.
- c. Personalized Learning Support: Technology in adaptive learning provides quick and accurate feedback, allowing teachers to pay more attention to students' individual needs.
- d. Development of individual potential: With an inclusive and needs-based approach, students can optimize their potential without feeling burdened by a uniform curriculum.
- e. Efficiency of the learning process: Learning time becomes more effective as students only focus on material that is relevant to their needs.

However, there are some challenges in implementing adaptive learning in inclusive education:

1. Technology and Infrastructure Limitations: Adaptive education relies heavily on technology. Infrastructure unpreparedness, especially in certain regions, can be a major barrier.
2. Teacher Competencies: Teachers require specialized training to effectively implement adaptive learning, including the ability to utilize technology and understand individual student needs.
3. Implementation Costs: Providing software and hardware that support adaptive learning requires a significant investment.
4. Equality of Access: Not all students have equal access to technological devices, which can widen the gap in learning.
5. Algorithm Limitations: Although adaptive learning is based on advanced technology, algorithms may not always be able to capture all aspects of individual student needs, especially those that are emotional or social in nature.

By addressing these challenges, adaptive learning can be an effective solution to creating an inclusive education environment that is more responsive to the needs of all students.

### Method

This research uses a descriptive-qualitative approach with a literature study to understand the phenomenon of inclusive education in depth, especially in the context of implementing adaptive learning designs. Qualitative research allows in-depth exploration of the implementation of adaptive learning designs, particularly in understanding the needs of early childhood children with diverse abilities. The data collection techniques in this study were carried out through searching and analyzing literature which included books, scientific journal articles, research reports, regulations, policy documents, and other related publications. These

sources were purposively selected based on their relevance to the research theme, namely adaptive learning design in the context of inclusive education. Data analysis was conducted using a descriptive-qualitative approach through the following stages:

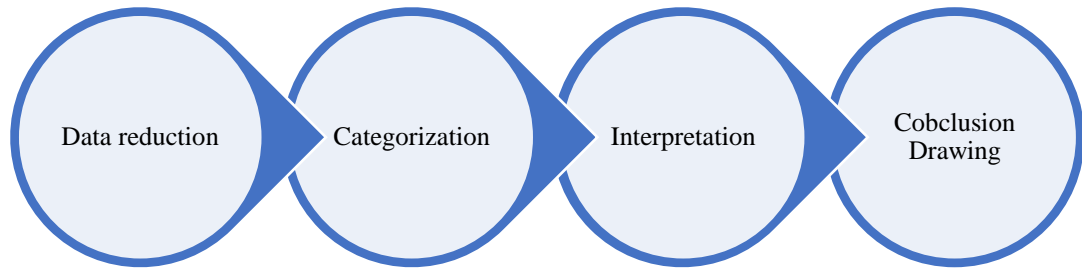


Figure 1. Analysis Stages of Descriptive-Qualitative Approach

**Result and Discussion**

This study reveals some important findings related to the implementation of adaptive learning design in inclusive education for young children with diverse abilities. These findings are then discussed with reference to the relevant literature review to strengthen the results of the analysis:

**1. Diversity of Early Childhood Needs**

Early childhood has unique learning characteristics, influenced by various factors such as cognitive, emotional, social development, as well as their family and cultural background (Rista, 2009). This condition shows the importance of an individualized approach to learning. Menurut Hidayatullah & Nurhaeni (2018), children with special needs, such as developmental delays or autism spectrum disorders, can show significant progress if they receive appropriate educational interventions early on. In inclusive education, this variation in needs becomes the foundation for building a learning environment that supports each child's potential while respecting their diversity.

This diversity requires educators to recognize and adapt learning strategies based on the specific needs of each child. For example, children with visual learning styles find it easier to understand information through pictures, diagrams or videos, while children who tend to have kinesthetic learning styles prefer activities that involve movement, object manipulation or hands-on exploration. By implementing a varied approach, each child can feel valued and get the opportunity to learn in a way that suits them best

Teachers' understanding of these varying needs is crucial to success in adaptive learning. Teachers who are able to understand the uniqueness of each child and adapt their approach will create an inclusive learning environment where children feel accepted, respected and supported (Sari & Sitepu, 2024). When children feel valued, they tend to have better self-confidence and are more motivated to participate in the learning process. This not only helps their academic development, but also promotes emotional and social progress.

Furthermore, the diverse needs of early childhood also point to the importance of collaboration between teachers, parents and the community. Parents have a deep understanding

of their child's needs and characteristics, while teachers have the ability to design and implement learning methods. With effective communication and good cooperation, both parties can create an optimal learning environment. In addition, the community can also contribute by providing resources and support, such as inclusive education programs or training for educators.

Understanding the diverse needs of young children is a crucial step towards realizing inclusive and adaptive education. Through a holistic approach and close collaboration, every child has the opportunity to develop optimally according to their unique potential.

## **2. The Importance of Teacher's Role in Implementing Adaptive Learning Design**

Teachers have a very crucial position in the process of preparing and implementing adaptive learning. In addition to their role as learning facilitators, teachers also serve as the main liaison that bridges students, families, and experts, such as therapists, psychologists, or educational counselors. In carrying out this role, teachers help identify children's specific needs and collaborate with various parties to develop appropriate learning strategies. Octavia (2019) emphasizes that effective collaboration between teachers, parents and other professionals is an important element in designing a holistic learning approach to support children's development.

Teachers' tasks in adaptive learning cover many aspects, from designing lesson plans that are aligned with students' individual needs to creating an inclusive and welcoming learning atmosphere. This approach allows children with different needs, whether in cognitive, social, emotional or physical aspects, to have relevant and meaningful learning experiences. Competent teachers are able to recognize students' different learning styles, such as visual, auditory or kinesthetic, and adjust learning methods to accommodate this diversity.

The successful implementation of adaptive learning by teachers is strongly influenced by the training they receive. Appropriate training provides teachers with an understanding of educational theory, diverse learning techniques and the use of educational technology to support learning (Rambe et al., 2022). Teachers who are knowledgeable about the unique needs of each child can design learning experiences that not only help academic development, but also support students' social and emotional aspects. Dian Andesta (2018), states that by understanding the level of needs and character of children, there will be no mistakes in educating and teaching in order to form children's personalities who are faithful, intelligent and have character.

In addition to technical skills, teachers' ability to build positive relationships with parents is also important. In adaptive learning, the role of parents is essential to ensure continuity of learning between school and home. Teachers who actively involve parents in supporting their children's learning can create a strong synergy, resulting in optimal educational success. In addition, teachers must also be agents of change who champion inclusive education. They need to ensure that all students, including those with special needs, feel valued and accepted in the classroom. With close collaboration between teachers, parents and the community, as well as continuous training, teachers can create effective and meaningful adaptive learning, so that the potential of each student can be developed to the fullest.

## **3. Use of Media and Technology in Adaptive Learning**

Adaptive approaches offer teaching that allows teaching to be tailored to the needs of each student. Relita Buaton dan Mesra Betty Yel (2022), state that the vision and mission of Indonesian Education, which is oriented towards the development of digital technology, opens up opportunities to create adaptive learning systems. This system utilizes smart technology to personalize learning according to student needs, including by adapting tutoring styles to suit individual learning preferences. This adaptive learning design approach is in line with the concept of Merdeka Curriculum, which is now the main curriculum in Indonesia. This

curriculum is designed to give schools and teachers the illusion of customizing the learning process based on students' needs, potential and interests (Syukriah, 2022). This provides space for teachers to design learning approaches, including the use of learning media, to suit students' development and needs.

Learning media is one of the important components in the learning system. In order for learning media to function optimally, this component must be in accordance with other elements in the learning system, such as learning objectives, types of material, user conditions, and learning environment. According Husein Batubara dan Dessy Noor Ariani (2019), adaptive learning media needs to be designed based on learning theory, educational regulations, and religious perspectives. The development procedure includes analysis of learning conditions and needs, media design, design realization, and continuous evaluation by involving experts and users to ensure the quality of the resulting media.

The importance of this adaptive approach is even more apparent as each child has a unique way of learning, influenced by developmental factors and individual preferences. Research conducted by Hall et al. (2015) states that digital-based technologies, such as software and applications tailored to support specific student needs, can increase student engagement in inclusive learning environments, emphasizing the importance of technology in creating more personalized and interactive learning experiences. For example, interactive modules designed with a game-based approach can help students understand basic concepts such as numbers, colors and shapes in a more fun and accessible way. echnology also opens up opportunities for teachers to implement dynamic and interactive learning, such as educational apps that provide immediate feedback and challenges according to students' abilities. This allows students who quickly grasp the material to continue learning, while students who take longer can learn at a comfortable pace.

Digital technology also plays an important role in creating inclusive learning. Tools such as assistive text readers for students with visual impairments or alternative communication devices for students with speech or hearing impairments enable more active participation. In addition, cloud-based learning platforms support collaboration between students, teachers and fellow students, and facilitate access to materials and discussions anytime and anywhere.

The use of visual media and technology in learning not only supports students with special needs, but also enriches the learning experience of all students. For example, animated videos can help students with visual and auditory learning styles understand material in a more vivid and engaging way. Technology-based media often allows students to repeat material as needed, thus deepening understanding.

Thus, the application of media and technology in adaptive learning supports the creation of a more inclusive, personalized and interactive learning environment. Technology is not just a tool, but an integral element in a holistic learning experience, enhancing educational effectiveness for all students.

## Conclusion

Based on the description of the results and discussion above, it can be concluded that the implementation of adaptive learning design is very important to support inclusive education for young children with diverse abilities. This research identified three main aspects that support the success of adaptive approaches: the diversity of children's needs, the role of teachers, and the use of media and technology. The diverse needs of young children require learning approaches that suit individual characteristics, such as visual, auditory or kinesthetic learning styles. Teachers who understand the uniqueness of each child and are able to adjust learning strategies can create an inclusive learning environment that supports children's academic, social

and emotional development. Collaboration between teachers, parents and the community is also crucial in meeting children's needs holistically. The role of the teacher in adaptive learning is crucial, not only as a facilitator but also as a liaison between students, families and other professionals. Teachers' ability to design appropriate learning strategies, supported by ongoing training, is key to success in creating meaningful learning for all students. The use of media and technology plays a significant role in supporting adaptive learning. Digital technologies, such as educational apps and interactive software, enable personalization of learning according to student needs. Visual media, animated videos and interactive modules can increase student engagement, enrich the learning experience and create a dynamic and inclusive learning environment. Through the collaboration of various parties and the utilization of modern technology, the implementation of adaptive learning design can support effective inclusive education, providing optimal opportunities for children to develop according to their potential.

### Bibliography

- Andesta, D. (2018). Analisis kebutuhan anak usia dasar dan Implikasinya dalam penyelenggaraan pendidikan. *JIP (Jurnal Ilmiah PGMI)*, 4(1), 82–97. <https://doi.org/https://doi.org/10.19109/jip.v4i1.2269>
- Batubara, H. H., & Ariani, D. N. (2019). MODEL PENGEMBANGAN MEDIA PEMBELAJARAN ADAPTIF DI SEKOLAH DASAR. *Muallimuna (Jurnal Madrasah Ibtidaiyah)*, 5(1), 1–10. <https://doi.org/https://orcid.org/0000-0003-4277-8278>
- Boiliu, E. R., & Messakh, J. J. (2024). Pembelajaran Adaptif sebagai Inovasi Strategi Pembelajaran bagi Anak Usia Dini. *Real Kiddos Jurnal Pendidikan Anak Usia Dini*, 2(2), 133–153. <https://doi.org/10.53547/realkiddos.v2i2.528>
- Buaton, R., & Yel, M. B. (2022). Model Pembelajaran Adaptif dan Cerdas Dalam Mewujudkan Profil Pelajar Pancasila. *Prosing: Seminar Nasional Riset Informasi Science*. <https://doi.org/http://dx.doi.org/10.30645/senaris.v4i2.220>
- Harfiani, R., & Setiawan, H. R. (2019). Model Penilaian Pembelajaran Di Paud Inklusif. *Ihya Al-Arabiyah: Jurnal Pendidikan Bahasa Dan Sastra Arab*, 5(2), 235–243. <http://jurnal.uinsu.ac.id/index.php/ihya/article/view/6473>
- Heldanita. (2018). Konsep Pendidikan Inklusif Pada Lembaga Pendidikan Anak Usia Dini. *Golden Age Jurnal Ilmiah Tumbuh Kembang Anak Usia Dini*, 1(3), 16–24. <https://doi.org/10.14421/jga.2016.13-02>
- Hidayatullah, M., & Nurhaeni. (2018). Pembelajaran Nilai-nilai Islam pada Anak Berkebutuhan Khusus. *Jurnal Al-Hayah*, 1(2), 120-133.
- Khadijah, & Jf, N. Z. (2021). *Perkembangan Sosial Anak Usia Dini “Teori dan Strateginya.”* CV. Merdeka Kreasi Group (Anggota IKAPI).
- Kholis, A. (2024). *Pembelajaran Adaptif ( Adaptive Learning )*. Gurunovatif. <https://gurunovatif.id/artikel/pembelajaran-adaptif-adaptive-learning>
- Kurniawati, H., Satyaninrum, I. R., & Astutik, F. A. (2021). Desain Pendidikan Inklusi di Masa Pandemi Covid-19. *Jurnal Dirosah Islamiyah*, 3(2), 246–261. <https://doi.org/https://doi.org/10.47467/jdi.v3i2.394>
- Lestarinigrum, A. (2017). IMPLEMENTASI PENDIDIKAN INKLUSIF UNTUK ANAK USIA DINI DI KOTA KEDIRI (STUDI PADA PAUD INKLUSIF YBPK SEMAMPIR, KECAMATAN KOTA, KEDIRI). *Jurnal Care (Children Advisory Research and Education)*, 4(2), 53–68. <https://doi.org/https://doi.org/10.25273/jcare.v4i2.967>
- Mulyadi, S., & Kresnawaty, A. (2020). *Manajemen Pendidikan Inklusif Anak Usia Dini*. Ksatria Siliwangi.
- Muttaqien, M. D. (2023). Penyelenggaraan Pendidikan Inklusi pada Pendidikan Anak Usia

- Dini. *JOURNAL OF DISABILITY STUDIES AND RESEARCH*, 2(2), 12–23.  
file:///C:/Users/NURUL/Downloads/2078-Article Text-7814-1-10-20240105.pdf
- Octavia, S. A. (2019). *Sikap dan Kinerja Guru Profesional*. Deepublish (Grup Penerbit CV Budi Utama).
- Pangestuti, S. T., & Darsinah. (2023). Pembelajaran Inklusi pada Anak Usia Dini: Bagaimana Sistem Pengelolaannya? *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 7(3), 3509–3518.
- Pendidikan, D. M. (2024). *Pembelajaran Adaptif: Menyesuaikan Pendidikan untuk Setiap Siswa*. UNESA (Universitas Negeri Surabaya).  
<https://s3mp.fip.unesa.ac.id/post/pembelajaran-adaptif-menyesuaikan-pendidikan-untuk-setiap-siswa>
- Rahimah. (2021). Peningkatan Kualitas Pendidikan Pada Lembaga Paud. *Seminar Nasional Teknologi Edukasi Sosial Dan Humaniora*, 1(1), 713–718.
- Rambe, S. K., Jf, N. Z., Albi, N. A., & Pratama, Y. (2022). PELATIHAN, RUANG LINGKUP DAN ISLAM, KEPROFESIAN GURU PENDIDIKAN AGAMA. *Abdi Cendekia: Jurnal Pengabdian Masyarakat*, 1(1), 22–26. <https://zia-research.com/index.php/abdicendekia>
- Rista, A. (2009). *Hubungan Pendidikan anak usia dini (PAUD) dengan perkembangan anak usia pra sekolah di kelurahan Tinjoyomo Kecamatan Banyumanik Semarang*. STIKes Semarang.
- Sari, M., & Sitepu, J. M. (2024). Peran Guru dalam Mengatasi Anak Temper Tantrum melalui Metode Time Out pada Aktivitas Pembelajaran. *Murhum: Jurnal Pendidikan Anak Usia Dini*, 3(4), 230–241. <https://doi.org/https://doi.org/10.37985/murhum.v5i1.518>
- Syukriah, E. (2022). *Pengembangan Kurikulum Merdeka Belajar*.