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Systematic Literature Review for User Interface Design and User Experience of Animation Media in Enhancing the Concentration of Children with Special Needs

Kajian Literatur Sistematis Desain User Interface dan User Experience Media Animasi Dalam Meningkatkan Konsentrasi Anak Berkebutuhan Khusus Tunagrahita

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ABSTRACT

This systematic literature review investigates the role of User Interface (UI) and User Experience (UX) in animated learning media for enhancing the concentration of children with intellectual disabilities. Drawing from 30 selected publications, the study highlights previous findings that well-designed digital media can significantly improve learning outcomes for children with special needs. Using inclusive criteria, the research incorporates observations of learning environments and interviews with educators at SLB Negeri 2 Denpasar. The effectiveness of UI/UX elements is assessed through the Questionnaire for User Interface Satisfaction (QUIS) and the User Experience Questionnaire (UEQ). Key insights emphasize the impact of intuitive and engaging design in sustaining concentration and aiding comprehension. The study offers practical guidelines for developing accessible and effective learning tools, underscoring the importance of inclusive design practices in special education and providing a valuable foundation for future educational technology advancements.

INFO ARTIKEL

Kata kunci:
desain antarmuka, pengalaman pengguna, media animasi, anak berkebutuhan khusus

ABSTRAK

Tinjauan literatur sistematis ini menyelidiki peran User Interface (UI) dan User Experience (UX) dalam media pembelajaran animasi untuk meningkatkan konsentrasi anak-anak dengan disabilitas intelektual. Data diambil dari 30 publikasi terpilih, penelitian ini menyoroti temuan sebelumnya bahwa media digital yang dirancang dengan baik secara signifikan dapat meningkatkan hasil pembelajaran bagi anak-anak berkebutuhan khusus. Dengan menggunakan kriteria inklusif, penelitian ini menggabungkan pengamatan lingkungan belajar dan wawancara dengan pendidik di SLB Negeri 2 Denpasar. Efektivitas elemen UI/UX dinilai melalui Kuesioner Kepuasan Antarmuka Pengguna (QUIS) dan Kuesioner Pengalaman Pengguna (UEQ). Wawasan utama menekankan dampak desain yang intuitif dan menarik dalam mempertahankan konsentrasi dan membantu pemahaman. Studi ini menawarkan panduan praktis untuk mengembangkan alat pembelajaran yang mudah diakses dan efektif, menggarisbawahi pentingnya praktik desain inklusif dalam pendidikan khusus, dan memberikan dasar yang berharga untuk kemajuan teknologi pendidikan di masa depan.

Introduction

The development of digital technology has made a significant impact in the world of education, especially in creating innovative learning media for children with special needs. Effective User Interface (UI) and User Experience (UX) designs play an important role in improving these children's interaction and understanding of the subject matter. According to research by Park (2012), animated media can facilitate more effective learning for children with autism by enhancing their creativity and understanding of the material.

Children with special needs, such as those with intellectual disabilities, face substantial challenges in focusing and processing abstract information. Therefore, simple and visually appealing UI/UX design is an urgent need in learning media development. Leslie and Uta (1988) revealed that children with special needs often struggle to complete complex cognitive tasks that children without special needs can usually complete. For this reason, friendly and interactive UI/UX design can provide a supportive learning environment, helping children to manage their limitations and improve their cognitive abilities. Animated media has been shown to be effective in improving student engagement, especially for children with disabilities, as it is able to explain concepts visually in an interesting way. Susanto (2013) mentions that children at primary school age are at the concrete operational stage, which means they need learning media that can help them to understand abstract concepts through concrete visualization, and therefore, optimizing UI/UX in animated media not only improves children's concentration but also makes it easier for them to learn the material more effectively and fun.

User Interface (UI) and User Experience (UX) play a crucial role in creating inclusive and effective learning media for children with special needs (ABK). These children, who often face challenges in understanding abstract concepts and focusing, need intuitive and user-friendly designs to maximize their learning experience. Animated media with a simple UI and interactive UX can help reduce confusion and enhance their understanding. According to Park (2012), the use of animation in learning has been proven to enhance engagement and understanding in children with autism, demonstrating the importance of tailored design for their needs. The important role of UI/UX lies not only in simplifying information but also in creating engaging and motivating experiences. Responsive and engaging design can enhance the concentration of children with special needs, allowing them to focus more on the presented material. As it was stated by Leslie and Uta (1988), children with cognitive limitations often require concrete visual aids to understand complex tasks. Thus, specially designed UI/UX can provide effective solutions, support the learning process of children with special needs, and help them develop cognitive skills optimally.

Mengist et al. (2020) revealed that systematic literature review (SLR) is a research method used to identify, evaluate, and synthesize all relevant research that is relevant to a particular topic. The aim of the SLR is to reconstruct existing information from relevant research and answer research questions using existing empirical data (Pejić-Bach & Cerpa, 2019). This method can help researchers to avoid bias in selecting articles and improve the accuracy of research results. SLRs are widely used in fields such as health, psychology, and information technology (Boell & Cecez-Kecmanovic, 2015).

Learning is one way for humans to know many things. Learning can also help people live their own lives. The way of learning for each individual is also different, adjusting how each individual can receive, manage, process, and implement the things they learn (Cumming, Bereiter & Scardamali, 2013). Learning is also important for people who experience deficiencies in terms of body and soul, mental health, and other needs that make learning become important for them, so they need a special way of doing it. Children with special needs can be used as subjects in a learning process that requires certain ways to understand what they are learning (Maryanti et al., 2020). According to Sainero (2013), children with special needs are children who have physical, intellectual, emotional, and social limitations. Children with special needs (ABK) have a condition where they experience obstacles in their development, so it is not the same as the development of their peers. It is these constraints that cause children with special needs to require special handling. Special needs explicitly refer to children who are born with

conditions or variances from the average conditions of typically developing children, encompassing physical, mental, and social behavioral characteristics (Oktaviana, 2023). Children with special needs are categorized based on several characteristics, namely visual impairment, hearing impairment, intellectual disability, physical disabilities, and emotional or behavioral disorders.

According to Utami (2017), the 2013 curriculum emphasizes learning through the domain of instructional media, highlighting the need to optimize the use of varied instructional media. This approach assists students in grasping abstract concepts. Learning should make use of diverse learning resources specifically designed for instructional purposes ('by design'). As emphasized by Susanto (2013), elementary school students, according to Piaget's theory, are in the concrete operational stage. Based on this cognitive development, elementary school-aged children generally encounter difficulties in understanding and concentrating during learning sessions when the material presented is abstract. Similar challenges are experienced by children with autism. The difficulties that children with special needs face in comprehending material during the learning process are due to the triad of autism (social interaction impairments, communication impairments, and behavioral and interest impairments). According to Cashin, Sci & Barker research (2009), the true triad of impairments in autism consists of conflicting visual language processing (communication), difficulties in abstract thinking, and a lack of comprehension when receiving information.

The rapid pace of development of science and technology at this time makes everyone aggressively participate in development in all aspects, one of which is in the field of education. Entering the era of globalization, which is full of competition between developed countries, Indonesia must participate in developing the potential of its human resources by utilizing all resources and efforts and utilizing the development of science and technology (Utami, 2017). According to Moore, McGrath, & Thorpe (2000), there is evidence that shows that learning with applications in the form of digital media, such as animation in computers using digital software, will be able to be well received by students with special needs and provide enormous potential for them in learning. The research framework is a literature review that looks at the problems that kids with intellectual disabilities face because of the disorders that these kids already have, such as social disorders, communication disorders, theories about being slow to accept new ideas, and theories about cognitive disorders in learning. Park (2012) stated that digital learning media in the form of animation can increase creativity and understanding of material in autistic Asperger's children.

In accordance with the results of research by Leslie & Uta (1988), they found that children with special needs have a level of understanding. Even in children with intellectual disabilities aged seven years, it is difficult to complete tasks that are usually done by children aged three to four years. Children with special needs in particular experience obstacles in the ability to imagine or think abstractly, thus inhibiting the concept of thinking of children with intellectual disabilities. Suasmoro revealed the need to develop educational media, emphasizing that animation should not only be enjoyable but also educational (republika.co.id, 2011). Animated videos in the world of formal and informal education have the opportunity to improve the education system for the better (Astuti et al., 2019). Departing from the popularity of digital learning media, educators think that they have a beneficial opportunity to use digital media components and apply them to learning that is tailored to the curriculum. Learning media must have an interactive interface design and contain fun elements.

Rifai et al. (2020) explained in their research that educational games are specialized learning tools designed to guide students (users) towards selected learning objectives, enhancing conceptual understanding, providing lessons to sharpen their skills, and encouraging them to comprehend and improve their concentration levels. Conversely, according to Astuti et al. (2019), reasons for using animated videos for learning include the connection between action and thinking. A well-designed learning game can provide authentic practice in thinking and working within specific contexts. The research findings from Drozdikova-Zaripova (2020) demonstrate that the interaction among students directly involved in digital learning methods can increase student engagement during the learning process.

The results of the above observations and analysis are also in line with the results of research conducted by Suryadinata & Farida (2015), which stated that providing learning media through DIY clock games influences the improvement of concentration in autistic children. The effectiveness is evident in the increased concentration levels of children in each phase (from the first meeting to the fifth meeting). The research findings also align with the study by Suryadinata & Farida (2015) that special needs children, specifically students with mild intellectual disabilities, may struggle with complex thinking processes regarding the concept of time, especially when associated with the three thinking process steps according to Syaputra (2020): forming an understanding, forming an opinion, and drawing conclusions.

Based on Law Number 23 of 2002 concerning Child Protection, it mandates that children with special needs are part of the Indonesian population and need attention and protection from the government, society, and families (Afkar et al., 2020). One of the driving factors for conducting this research is the rare use of children with special needs as research topics. Teachers who work with children who have special needs require innovative teaching tools (Cagiltay et al., 2019). Children with special needs can enhance their concentration and aid in their understanding process by using animation as a learning medium. This research will analyze the implications of the user interface and user experience of animated media for learning.

Method

This research uses the approach of several previous studies as references and data collection through observation and interviews to explore the role of User Interface (UI) and User Experience (UX) in animated learning media, particularly in enhancing the concentration of children with intellectual disabilities. Primary data were obtained from 30 selected publications relevant to the research topic, sourced from platforms such as Scopus, Google Scholar, and educational journals. The publications were chosen based on strict inclusion criteria, such as the relevance of the UI/UX topic in special education, publication years within the last 5-10 years, and research methods that support the focus of this study. Additional data were collected through direct observation at SLB Negeri 2 Denpasar, where children's interactions with animation media were studied to understand the influence of UI/UX elements on their concentration. Semi-structured interviews with five educators were also conducted to gain in-depth insights into the most effective UI/UX elements in maintaining children's attention.

The effectiveness of UI/UX elements was assessed using the user interface satisfaction questionnaire (QUIS) and the user experience questionnaire (UEQ), which provide quantitative metrics to evaluate user satisfaction and experience levels. Qualitative data analysis from interviews was conducted using a thematic approach, revealing patterns and key themes related to successful design strategies. Meanwhile, quantitative data from the results of QUIS and UEQ were processed to provide a statistical overview of the impact of the designed UI/UX. The research findings indicate that intuitively designed and engaging animated media significantly help improve the concentration and understanding of children with intellectual disabilities. One quote from an educator's interview underscores this: "Children are more focused when the animated media has engaging visual elements and bright colors, yet remains simple so as not to distract them from the learning content." Additionally, observations noted that children showed increased concentration when they were using media with easy-to-understand navigation and a consistent layout. This study provides practical guidance in the development of inclusive and effective learning tools, highlighting the importance of designs that are responsive to special needs in education.

Results and Discussion

Based on the observations from previous research, the learning system is conducted through personal computer (PC) or laptop devices connected to the internet network. Learning technology can be used to facilitate these learning activities. Learning technology, as software, takes the form of systematic methods in solving increasingly sophisticated learning problems and has gained widespread acceptance

in the field of education (Yusuf et al., 2021). With such a critical approach, there is a need for technology-based learning media that can foster student independence, such as interacting with teachers and focusing on children with special needs. The use of interactive multimedia or digital media in learning can be effective.

According to Nozomi (2018), animation is a collection of images processed in such a way as to create movement. One of the advantages of animation is its ability to systematically explain an event during each phase of change over time. The use of animation in learning aims to maximize visual effects and provide continuous interaction, thereby enhancing understanding of the subject matter. It also has the capability to present something complex or intricate solely through images and words. According to Mahfudz & Billah (2020), interactive multimedia-based learning can enhance students' understanding of the material.

The use of a Systematic Literature Review (SLR) is very important for synthesizing existing research in a structured and unbiased manner. Mengist, Soromessa, & Legese (2020) discuss the importance of SLR in systematically collecting and analyzing empirical data, which has been very beneficial in fields such as health and technology to improve research outcomes (Pejić-Bach & Cerpa, 2019). In the field of educational technology, Yusuf et al. (2021) highlight the importance of utilizing interactive multimedia to facilitate better concentration and learning among children with special needs. This is supported by Park (2012), who emphasizes that digital animation can enhance both creativity and understanding, especially for students with autism, by making abstract concepts more accessible and engaging. Leslie and Frith (1988) also found that children with special needs struggle with abstract thinking, further emphasizing the need for customized and visually rich educational tools.

Additionally, Astuti et al. (2019) provided evidence of the effectiveness of using Adobe Flash-based learning media, which showed a significant increase in student understanding and engagement. This work demonstrates the potential of animation to transform traditional learning methods into interactive experiences that meet various learning needs. However, integrating such technology comes with challenges, including complexity and cost, as highlighted by Costa & Santos (2017), who explored the benefits and drawbacks of using audiovisual aids such as augmented reality and animated videos in education. Collectively, these studies emphasize the important role of innovative digital media in enhancing educational outcomes for children with special needs and highlight areas where further refinement is needed to optimize usability and accessibility.

The results and discussion will be analyzed in accordance with the research systematic that leads to an analysis using a literature-based approach, which involves the research questions (Snyder, 2019). In the first stage, the researcher determined a research question. The search results will be determined depending on inclusion and exclusion criteria. This method produces 30 journals, after which data scanning is performed. These are the research questions that were developed in response to the needs of the chosen topic. Research questions are made based on the needs of the chosen topic. It was investigated by researchers who study learning media to increase the concentration of children with special needs.

- RQ1. What learning media have children with special needs used the most in the last five years, beginning in 2023?
- RQ2: What are the shortcomings of the most often utilized learning media?
- RQ3: How can effective learning media be used to improve the concentration of children with special needs?

These research questions act as the guiding concept for the entire research process, assisting in the framing of the study, determining its scope, and guiding data collection and analysis.

Based on the results of the research questions, they can be analyzed in accordance with relevant literature. Specifically, in relation to the questions posed in RQ1, RQ2, and RQ3, they can be linked to several relevant references. Interactive learning media intended for teachers or educators can assist children with intellectual disabilities in grasping material comprehension and assigned tasks. Learning

media in the form of digital animation will be associated with graphic components such as color, lines, shapes, and modified objects used in animation media. Consistent with Yanuarti's research (2019), learning using digital media on computers with digital software by students with special needs has a significant impact on enhancing their understanding in learning. Additionally, Wiyaka (2018) mentions that interactive games can capture the attention of students with intellectual disabilities. These students are highly engaged with modified learning media featuring interesting concepts, enabling them to focus their concentration. Several previous research findings indicate that using animated learning media for teaching materials can enhance learning outcomes and concentration among students with intellectual disabilities. Compared to earlier studies and tests by Utami (2017), there was a clear improvement in how well students understood the material and how much they learned between the pre-test and post-test stages after using the media. This finding suggests a highly effective means of significantly improving concentration in students with special needs.

The use of digital media in the form of animation in learning is highly beneficial, as it allows children with special needs to provide feedback, comment, and retain the conveyed material better. According to Costa and Santos (2017), learning media in the form of animated videos can be classified as Audio Visual Aids (AVA) or media that can be seen and heard. Febliza & Okatariani (2020) explain that audiovisual media in the form of animation is a set of tools capable of projecting moving and audible images. Audio-visual technology is a means of delivering material using mechanical and electronic aids to present audio-visual messages. In the relevant study by Rifai et al. (2020) called "Development of basic technique animation learning media for Kihon Karate for junior high school students," the feasibility test showed that using animated video to help with basic karate movement training is very likely to work. Additionally, elementary school students can use it to support basic movement learning in tennis. Both this study and the referenced research are R&D studies that employ video animation media. The difference lies in the specific materials investigated.

Inclusion and Exclusion Criteria

In the next stage, the researcher determined inclusion and exclusion criteria. This stage determines the suitability of the discovered data for use in SLR research (Meline, 2006). A study is eligible for acceptance if it meets the following criteria: Data from the last five years was used. The data was obtained through the website https://scholar.google.com. The sole purpose of the information is to enhance the attentiveness of children with special needs through learning media.

Quality Assessment (Kmet et al., 2004)

In SLR research, the data found will be evaluated based on the following quality assessment criteria.

- QA1. Was the journal paper published in the last 5 years before 2023?
- QA2. Does the journal paper list the most often utilized learning media for children with special needs?
- QA3. Does the journal paper provide details about the learning media used to improve the concentration of children with special needs?

Results

1. Y (Yes): Published in the last 5 years of 2023, it is the most often utilized learning media for children with special needs.
2. N (No): if it does not match the question.

Table I shows Literature Review's Data obtained through the site https://scholar.google.com.

Table I Literature Review's Data

No.	Researcher	Title	Year	QA1	QA2	QA3	Result
1	Jaya, H., Haryoko, S., & Suhaeb, S.	Life skills education for children with special needs in order to facilitate vocational skills.	2018	Y	Y	Y	√
2	Baharuddin, B., & Dalle, J.	Transforming learning spaces for elementary school children with special needs.	2019	Y	Y	Y	√
3	Agustini, M., Yufiarti, Y., & Wuryani, W.	Development of learning media based on android games for children with attention deficit hyperactivity disorder.	2020	Y	Y	Y	√
4	Efendi, M.	The implementation of inclusive education in Indonesia for children with special needs: Expectation and reality.	2018	Y	Y	Y	√
5	Hadis, A., & Nurhayati, B.	Developing science process skill based learning in science for children with special needs course.	2018	Y	Y	Y	√
6	Hasugian, J. W., Gaurifa, S., Warella, S. B., Kelelufna, J. H., & Waas, J.	Education for children with special needs in Indonesia.	2019	Y	Y	Y	√
7	Agustini, M., Yufiarti, Y., & Wuryani, W.	Development of learning media based on android games for children with attention deficit hyperactivity disorder.	2020	Y	Y	Y	√
8	Hasselbring, T. S., & Glaser, C. H. W.	Use of computer technology to help students with special needs.	2000	N	Y	Y	√
9	Wah, L. L.	Development of multimedia learning resources for children with learning disabilities in an undergraduate special education technology course. Malaysian Education Dean's Council (MEDC), 1, 29-36.	2007	N	Y	Y	√
10	Ammari, T., Schoenebeck, S., & Morris, M.	Accessing social support and overcoming judgment on social media among parents of children with special needs.	2014	N	Y	Y	√
11	Setiawati FA.	Mengenal Konsep-Konsep Anak Berkebutuhan Khusus dalam PAUD.	2020	Y	Y	Y	√
12	Widiastuti NL, Winaya IM.	Prinsip khusus dan jenis layanan pendidikan bagi anak tunagrahita.	2019	Y	Y	Y	√
13	Soleh MR, Nurajizah S, Muryani S.	Perancangan animasi interaktif prosedur merawat peralatan multimedia pada jurusan multimedia SMK BPS&K II Bekasi.	2019	Y	Y	Y	√
14	Rochyadi E.	Karakteristik dan Pendidikan Anak Tunagrahita. Pengantar Pendidikan Luar Biasa.	2012	N	Y	Y	√

15	Indrawati T.	Pelaksanaan pembelajaran anak tunagrahita.	2016	N	Y	Y	√
16	Putri N.	Efektifitas penggunaan media video untuk meningkatkan pengenalan alat musik daerah pada pembelajaran IPS bagi anak tunagrahita ringan di SDLB 20 Kota Solok.	2012	N	Y	Y	√
17	Ammari, T., & Schoenebeck, S.	Networked empowerment on Facebook groups for parents of children with special needs.	2015	N	Y	Y	√
18	Angreni, S., Sari, R. T., & Masyitah, I.	Development of Augmented Learning Media Reality for Students Learning Difficulties in Elementary School.	2023	Y	Y	Y	√
19	McFarlane, A., Sparrowhawk, A., & Heald, Y.	Report on the educational use of games.	2002	N	Y	Y	√
20	Han, J. H., Jo, M. H., Jones, V., & Jo, J. H.	Comparative study on the educational use of home robots for children.	2008	N	Y	Y	√
21	Hashey, A. I., & Stahl, S.	Making online learning accessible for students with disabilities.	2014	N	Y	Y	√
22	Donegan-Ritter, M.	STEM for all children: Preschool teachers supporting engagement of children with special needs in physical science learning centers.	2017	N	Y	Y	√
23	Olçay Gül, S., & Vuran, S.	Children with special needs' opinions and problems about inclusive practices.	2015	N	Y	Y	√
24	Anggra, R., Kashino, S., Vera, P., & Jiao, D.	Utilization of the Kinemaster Application as a Learning Media.	2023	Y	Y	Y	√
25	Blackhurst, A. E.	Perspectives on technology in special education.	1997	N	Y	Y	√
26	Chien-Yu, L., Chao, J. T., & Wei, H. S.	Augmented reality-based assistive technology for handicapped children.	2010	N	Y	Y	√
27	Al-Dababneh, K. A., & Al-Zboon, E. K.	Using assistive technologies in the curriculum of children with specific learning disabilities served in inclusion settings: teachers' beliefs and professionalism.	2022	Y	Y	Y	√
28	Kraleva, R.	ChilDiBu–A mobile application for Bulgarian children with special educational needs. International	2017	N	Y	Y	√
29	Lin, C. Y., Chai, H. C., Wang, J. Y., Chen, C. J., Liu, Y. H., Chen, C. W., ... & Huang, Y. M.	Augmented reality in educational activities for children with disabilities.	2015	N	Y	Y	√
30	Cahyo Adi Kistoro, H., Setiawan, C., Latipah, E., & Putranta, H. Cahyo Adi Kistoro, H., Setiawan, C., Latipah, E., & Putranta, H.	Teachers' Experiences in Character Education for Autistic Children.	2021	Y	Y	Y	√

Results and Discussion

This section will explain and answer the research question (RQ).

- RQ1: What learning media have children with special needs used the most in the last five years, beginning in 2023?

  Following the selection of data based on inclusion and exclusion criteria using the term "learning media for children with special needs" from 30 journals, the articles from journals were given a quality assessment. There are 30 relevant journal articles based on the quality assessment (QA) results, which are then categorized based on the learning media and the approach utilized to solve the study issue. These findings respond to RQ1 as follows: animation, application, gamification, and augmented reality.

- RQ2: What are the shortcomings of the most often utilized learning media?

  Each learning medium has its own set of advantages and disadvantages. The following are some common shortcomings associated with commonly used learning media: complexity, cost, and performance.

- RQ3: How can effective learning media be used to improve the concentration of children with special needs?

  The implementation of learning media for children with special needs must pay attention to user interface features such as simplicity, innovation, uniqueness, informativeness, and touchability.

Furthermore, the research will proceed with a mixed methods approach, which is a research approach that combines qualitative and quantitative research forms. Data analysis used the questionnaire of user interface satisfaction (QUIS) and the user experience questionnaire (UEQ). The QUIS is a tool developed to assess users' subjective satisfaction with specific aspects of the human-computer interface. It was developed in 1987 by a multidisciplinary team of researchers at the University of Maryland Human-Computer Interaction Lab. Meanwhile, UEQ is a questionnaire to measure user experience. The UEQ consists of 26 question items covering aspects of attractiveness, efficiency, clarity, novelty, and dependability. The exact number of items and the wording of the questions may vary depending on the version of the UEQ being used. In this study, the researcher adapts the questionnaire to suit the subject's specific needs and uses the Likert scale to score their experience. Table II displays the negative and positive statements of the UEQ.

Tabel II User Experience Questionnaire (UEQ)

Negative Statement	Lickert Scale	Positive Statement
obstructive	o o o o o	supportive
complicated	o o o o o	easy
inefficient	o o o o o	efficient
confusing	o o o o o	clear
boring	o o o o o	exciting
not interesting	o o o o o	interesting
conventional	o o o o o	inventive
usual	o o o o o	leading edge

Conclusion

This research uses observation and interview methods to analyze how user interface (UI) design and user experience (UX) in animation-based learning media can enhance the concentration of children with special needs. This study aims to provide insights into the effectiveness of digital media, as well as to identify the advantages and disadvantages of various media formats used in special education.

This research found that the media most frequently used to help children with special needs concentrate in the last five years (since 2023) includes animation, applications, gamification, and augmented reality. (augmented reality). This media was chosen because of its ability to provide an interactive and enjoyable learning experience, as well as its effectiveness in capturing students' attention.

Each type of media has its own strengths and weaknesses. Animation and applications, for example, are able to visualize abstract concepts effectively but often face challenges related to usability complexity, high costs, and device performance. Gamification can enhance student engagement, but it may require complex design. Augmented reality offers an immersive learning experience, but it also requires expensive infrastructure and advanced technology. This research underscores the need to address these challenges to maximize the potential of digital media.

To make digital learning media effective, the interface and user experience design must pay attention to important features. Simplicity is key, so the media is easy to use for children with special needs. Innovation and uniqueness are also necessary to maintain their interest and attention. The information presented must be clear and interactive so that children can understand and interact with the content effectively. Tangible elements are also recommended to enhance the learning experience.

This study provides valuable insights for developers of digital learning media specifically designed for children with special needs. By integrating intuitive and innovative UI/UX design, it is expected that animation-based learning media can significantly enhance concentration and understanding of the material. These findings also highlight the importance of developing media that considers the special needs of children, both in terms of accessibility and learning effectiveness.

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