Systematic Literature Review: Trends in Maths Learning Media for Students with Learning Disabilities

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Abstract: Mathematics is a discipline that studies logic, making it challenging to teach abstract and conceptual topics to students with intellectual disabilities. This study aims to systematically review educational research related to mathematics learning media for students with intellectual disabilities using a Systematic Literature Review (SLR) methodology. The research employed the PRISMA method using Covidence software. Initially, 200 articles indexed in Google Scholar were obtained through Publish or Perish using keywords such as "learning media," "mathematics learning," and "intellectual disabilities." After processing through Covidence, 38 articles meeting the researchers' criteria were selected. The analysis revealed that most articles were published in 2023, with a majority conducted in East Java. The article titled "Educational Counting Games for Elementary School Children Using Mobile-Based RPG Maker" was the most cited, with 265 citations. The most commonly used research method was Classroom Action Research (CAR). Additionally, the most frequently used learning media were teaching aids, mentioned in 12 articles.

Keywords: learning media, intellectual disabilities, mathematics

I. Introduction

Education can be delivered through training, teaching, and research that focuses on learning, skills, and ways of thinking across generations (Riyan Rinaldi et al., 2023). Sidiq and Nurhastuti (2023) emphasize that education is crucial not only for general students but also for those with special needs.

Mathematics is taught at all levels of education, including schools for students with special needs (Pradnyana et al., 2020). According to Maulidiyah and Sunandar (2019), mathematics is a discipline that studies logic, making it difficult to teach abstract and conceptual topics to students with intellectual disabilities.

Students with developmental intellectual disabilities require special educational services due to challenges in academic tasks and social interactions (Saputra et al., 2020). Saputra (2020) states that to make learning more engaging and enhance students' enthusiasm, effective teaching strategies must be carefully considered. The goal of education for students with intellectual disabilities is to maximize their potential, fostering independence and competency (Syarifah, 2021).

With the rapid advancement of technology, particularly in electronic multimedia, learning media can serve as an alternative to improve arithmetic skills among students with disabilities. The use of technology in education has been shown to capture students' attention and enhance concentration during lessons. This aligns with research indicating that students with intellectual disabilities struggle with memory retention and maintaining focus due to lower cognitive and memory abilities (E. Sari & Natalia, 2018).

One effective way to make learning more enjoyable is through educational games. Games can serve as an excellent strategy to increase enthusiasm among students with intellectual disabilities during learning activities. Android-based RPG Maker MV, for example, helps students grasp mathematical concepts such as addition, subtraction, multiplication, and division. Yosiani explains that children with intellectual disabilities experience mental and intellectual challenges that affect their cognitive development and adaptive behavior. These challenges include difficulty focusing, emotional instability, preference for solitude, sensitivity to light, and other related issues (Lestari,

2024). Similarly, Sanusi and Dianasari (2020) describe "intellectual disability" as referring to individuals with below-average intelligence quotient (IQ) affecting their affective, cognitive, and psychomotor abilities. They are characterized by an inability to modify their behavior towards others and themselves.

Based on the analysis of learning media used for students with intellectual disabilities, this study aims to answer several main questions, namely how many research articles have been published on learning media for students with intellectual disabilities based on the year of publication, what is the distribution of these research articles based on geographical location, what are the most common research methods used in these studies, which research articles are most frequently cited in this field, and what are the trends in learning media for students with intellectual disabilities.

II.   Method

This study employs a Systematic Literature Review (SLR) methodology to identify, evaluate, and synthesize relevant literature on mathematics learning media for children with intellectual disabilities. Academic sources such as Google Scholar, Scopus, and ScienceDirect were searched using the keywords "learning media," "mathematics learning," and "intellectual disabilities." The study systematically reviews educational research related to the development of mathematics learning media for students with intellectual disabilities.

III.   Results and Discussion

Results

Based on the data obtained, it can be seen that starting from 2017 there was 1 publication until in 2024 there were 3 publications. The year that has the least number of publications is 2017 as many as 1 publication and 2023 with the highest number of publications as many as 12 publications.

The results showed that East Java dominated the number of studies with 10 articles, making it the region with the highest number of studies related to learning media for children with disabilities. Other regions such as Lampung, Yogyakarta, South Sulawesi, West Sumatra, and East Kalimantan have a significant number of publications, although not as many as East Java. Meanwhile, regions such as South Sumatra, Banten, Bali, and Southeast Sulawesi have very little research, even less than 2 articles. This data indicates that research on learning media for children with disabilities is still centred on a few regions, while other regions still need more attention. Therefore, future research could consider regions with a low number of publications as potential locations to broaden insights and further contribute to the development of learning media for students with disabilities across Indonesia.

From a number of sources that have been collected, the article entitled Educational Counting Game for Elementary School Children Using Mobile-Based RPG Maker from the Journal of Information Technology and Systems is the most cited article, which is 265 times. Details can be seen in table 1:

Table 1. Widely cited articles related to mathematics learning media for children with disabilities

No	Research Title and Author	Journal	Citation
1	Educational Counting Game for Elementary School Children Using Mobile-based RPG Maker, Rinaldi et al. (2023)	Jurnal Teknologi dan Sistem Informasi	265
2	Design of a mobile-based maths game application for people with disabilities, Saputra et al. (2020)	Computatio: Journal of Computer Science and System Information	166
3	Learning media for number puzzles and number funnels for children with special needs Sari et al. (2020)	Kreano : Jurnal Matematika Kreatif-Inovatif	24

4	The Effectiveness of Dakon Traditional Games to Improve Counting Skills in Children with Disabilities, Hestyaningsih & Pratisti (2021)	Jurnal Intervensi Psikologi	11
5	Increasing Learning Interest of Tunagrahita Students Using STAD Model Assisted with Puzzle in Grade 1 Elementary School, Mawanti & Cholily (2021)	JP2SD (Jurnal Penelitian dan Pengembangan Sekolah Dasar)	4
6	Simple Counting Operations with Smart Ladder Media for Tunagrahita Children, (Maulidiyah & Sunandar, 2019)	Jurnal Ortopedagogia	4
7	Development of Game Belatung (Belajar Berhitung) Using Macromedia Flash 8 on Multiplication Materials for Children with Mild Tunagrahita, Makhmudah & Mahmudah (2020)	Jurnal Pendidikan Khusus	4
8	Effectiveness of the Use of Learning Media in Recognising Letters and Numbers for Tunagrahita Children, Herik et al. (2022)	Amal Ilmiha: Jurnal Pengabdian Pada Masyarakat	2
9	The Effect of Using Montessori Media on the Learning Achievement of Tunagrahita Students in SLB Tunas Sejahtera Sleman, Fajar & Hidayat (2023)	RIEMANN: Research Of Mathematics And Mathematics Education	2
10	'3D Animath": 3-Dimensional Animated Learning Media for Students with Tunagrahita, Nengah et al. (2022)	Karmapati: Kumpulan Artikel Mahasiswa Pendidikan Teknik Informatika	2
11	Media Gending Lenyak Lekit on Mathematics Learning Material Comparing Many and Few Objects for Students with Tunagrahita Class IV SLB Negeri 2, Purwasih (2022)	Special And Inclusive Education Journal	1
12	Pop-Up Media to Improve the Ability to Recognise Numbers 1-10 in Children with Tunagrahita, Wardani & Sudarsini (2017)	Jurnal Ortopedagogia	1
13	Development of Comic Mathematics Teaching Materials for Children with Special Needs (ABK) Students, Karlina et al. (2020)	Jurnal Edumath	1
14	Educational Games for Android-Based Tunagrahita Children on Multiplication Materials Based on Aspects of Gender Equity and Social Inclusion (GESI), Ferawati & Saputri (2022)	G-Tech Jurnal Teknologi Terapan	1
15	Android-based mixed arithmetic operation learning media for mentally retarded students at SLB-C Dharma Rena Ring Putra II, Ismawati et al. (2022)	Community Empowerment	1
16	Effectiveness of Dekak-Dekak Media on Addition Operations 1-10 for Mild Tunagrahita Students in Grade 1 SLB-YPAC Malang City, Yuniarti & Subasno (2020)	Jurnal Pelayanan Pastoral	1

Classroom Action Research (CAR) is the most widely used method with a frequency of 6 articles. Other methods such as R&D with the ploom model, Single Subject Research (SSR), Qualitative, and Game Development Life Cycle (GDLC) have a much lower frequency of use.

Overall, based on the 38 final articles, we can see in Figure 5 that the most frequently used learning media trend is using teaching aids. A total of 12 articles related to our search used teaching aids to facilitate the learning of students with disabilities, especially in learning mathematics. In the second rank, the most frequently used learning media is games. 8 articles conducted learning experiments with deaf students using game media. Then the use of applications is also a media trend that is quite widely used, a total of 6 related articles. There are 3 articles that use web media. Furthermore, the trend of using learning media using videos, pop ups and books is 2 articles each. Finally, the use of comics and montessori media is 1 article each.

Discussion

This research uses the systematic literature review (SLR) method to identify, evaluate and synthesize relevant literature on mathematics learning media for children with disabilities.

Math learning media for children with disabilities has undergone significant development. Various studies have been conducted to develop learning media that suit their needs. Based on the results of the research, the learning media that have been used are very diverse, ranging from technology-based applications such as math calculation applications and My Andromath, to conventional learning media such as cards, dakon, and towers.

Research related to mathematics learning media for children with disabilities continues to grow from year to year. This shows the continuous attention and efforts in improving the quality of education for children with disabilities. Various research methods are used in the development of this learning media, ranging from Research and Development (R&D), Classroom Action Research (PTK), and experimental methods. This comprehensive approach aims to ensure the effectiveness and suitability of the learning media to their needs.

One noticeable trend is the increasing use of technology-based learning media. Apps and animations are increasingly being used to improve interaction and motivation. The use of this technology is expected to provide a more interesting and enjoyable learning experience for children with disabilities. This is in line with a study conducted by (Bowman et al., 2020) which showed that the use of technology in math learning for children with disabilities significantly improved their math academic achievement.

Although many studies have been conducted, the development of mathematics learning media for children with disabilities still requires further attention. Further research is needed to evaluate the effectiveness of each learning medium and identify the best approach to math learning for children with disabilities. Thus, it is hoped that the quality of mathematics education for children with disabilities can continue to be improved.

IV. Conclusion and Suggestion

Based on the results of research using the SLR method, it can be concluded that research related to mathematics learning media for students with disabilities was produced in 2023 as many as 12 articles from the range of 2017 to 2024. Based on the location, it was found that East Java is a productive province in conducting research in this field. The article entitled Educational Counting Game for Elementary School Children Using Mobile-Based RPG Maker is the most referenced article, namely 265 times. The research method that is widely used is the CAR (Classroom Action Research) method. While the learning media that is widely used is teaching aids with a total of 12 articles.

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