Tarbiyah wa Ta'lim: Jurnal Penelitian Pendidikan dan Pembelajaran
https://journal.iain-samarinda.ac.id/index.php/Tarbiyawat/index
e-mail: jtarbiyahwatalim@gmail.com

November, 2025. Vol. 12, No. 3
p-ISSN: 2338-4530
e-ISSN: 2540-7899
pp. 323-334

Multisensory Learning with Multimedia Tutorials: A Quantitative Study in Pekanbaru Special School

[1*]Elvira Asril, [2]Syahtriatna, [3]Sri Wahyuni, [4]Lelly Zuyana Asril
[1*,2,3]Universitas Lancang Kuning, [4]Universitas Persada Bunda Indonesia

E-mail korespondensi: elvira@unilak.ac.id

Diserahkan: 1st November 2025; Direvisi: 20th December 2025; Diterima: 29th December, 2025

Abstrak

Penelitian ini dilatarbelakangi oleh masih terbatasnya pemanfaatan teknologi pembelajaran interaktif di sekolah luar biasa, pembelajaran belum mengintegrasikan media berbasis multimedia tutorial yang dapat mendukung pendekatan multisensori. Tujuan penelitian adalah untuk mendeskripsikan implementasi pembelajaran akademik multisensori bagi anak berkebutuhan khusus di SLB Negeri Pembina Pekanbaru serta menganalisis respon siswa dan guru terhadap penerapan pembelajaran multisensori berbasis multimedia tutorial. Metode penelitian yang digunakan adalah deskriptif kuantitatif, melibatkan sampel sebanyak 10 siswa dan 5 guru dari populasi 310 siswa dan 71 guru, menggunakan teknik purposive sampling. Pengumpulan data dilakukan menggunakan angket yang berisi 10 butir pernyataan untuk siswa dan 10 butsir pernyataan untuk guru, dengan skala likert lima tingkat. Data dianalisis secara deskriptif menggunakan perhitungan rata-rata (mean) dan persentase untuk menginterpretasikan tingkat respon. Hasil penelitian menunjukkan bahwa respon siswa berada pada kategori "sangat baik" dengan rata-rata skor 4,27. Sementara itu, respon guru juga berada pada kategori "sangat baik" dengan rata-rata skor 4,52. Hal ini menunjukkan bahwa penggunaan multimedia tutorial mampu meningkatkan minat, perhatian, dan pemahaman siswa dalam belajar, serta membantu guru dalam menyampaikan materi dengan cara yang lebih menarik dan efektif. Kesimpulan penelitian ini adalah bahwa penerapan multimedia tutorial sebagai media **dalam pembelajaran multisensori** memiliki potensi besar untuk meningkatkan efektivitas pembelajaran bagi anak berkebutuhan khusus.

Kata kunci: Anak Berkebutuhan Khusus (ABK), Multimedia Tutorial, Multisensory, Pembelajaran.

Abstract

This study was motivated by the limited use of interactive learning technology in special schools, where a multisensory approach supported by multimedia tutorial-based media has not yet been integrated into learning. This study aimed to evaluate multisensory academic learning for children with special needs at SLBN Pembina Pekanbaru, as well as the responses of students and teachers to this approach based on multimedia tutorials. A quantitative research method was employed, involving a sample of ten students and five teachers from a population of three hundred and ten students and seventy-one teachers, using purposive sampling technique. Data were collected using questionnaires containing ten statements for students and ten statements for teachers, each on a five-point Likert scale. The data were analyzed descriptively using mean calculations and percentages to interpret the response levels. The results indicate that the students' responses were in the "very good" category, averaging 4.27. The teachers' responses were also in the "very good" category, with an average score of 4.52. This indicate that multimedia tutorials can increase students' interest, attention, and understanding of the material, while helping teachers deliver it in a more interesting and effective way, have great potential to improve the effectiveness of multisensory learning for children with special needs.

Keywords: *Children with Special Needs, Learning, Multimedia Tutorial, Multisensory.*

How to Cite: Asril, E., Syahtriatna, S., Wahyuni, S., Asril, L. Z. (2025). Multisensory Learning with Multimedia Tutorials: A Quantitative Study in Pekanbaru Special School. *Tarbiyah wa Ta'lim: Jurnal Penelitian Pendidikan dan Pembelajaran, 12*(3) 323-334. doi: https://doi.org/10.21093/twt.v12i3.11975

https://doi.org/10.21093/twt.v12i3.11975

INTRODUCTION

Inclusive education requires teaching strategies that can accommodate cognitive diversity and students' learning styles (Anjarsari et al., 2021). Children with specific learning disorders, including dyslexia often need approaches that involve more than one sensory channel so that information can be processed and remembered more effectively (UNICEF, 2020). Children with special needs have unique characteristics that distinguish them from other children (Dağlı Gökbulut et al., 2024). They usually require special learning accommodations. This includes children with physical disabilities (blindness, deafness, and physical disabilities); intellectual disabilities (mental disability and learning difficulties); behavioral and emotional disorders (ADHD, ODD, anxiety, and depression); autism spectrum disorders; and special talents (Silitonga et al., 2023). Dyslexia is an intellectual disorder that typically involves specific learning difficulties. It affects a person's ability to read, write, and spell, despite having normal or above-average intelligence. Without appropriate intervention, this condition can hinder academic development (Faruq & Pratisti, 2022). Statistical data on children with dyslexia in Indonesia is limited and incomplete (Arifin et al., 2024). This is due to inaccurate diagnoses, limitations in official data collection, obstacles in the education system, and medical and administrative factors.

Empirical evidence on audio visual integration in multimedia learning shows that audio support can reduce reading barriers for students with dyslexia, although multimedia design must consider the effects of modality and redundancy to avoid creating counterproductive cognitive load (Knoop-van Campen et al., 2020). A recent systematic review also indicates that audiovisual multisensory integration enhances multisensory processing in diverse populations and holds promise as a beneficial approach for special educational interventions if adapted contextually (Pulliam et al., 2023)(O'Brien, J, 2023).

This study does not discuss how to identify children with dyslexia; rather, it analyzes which methods can support their learning process. One effective learning model for dyslexic children is the multisensory method. This educational approach uses various sensory cues to provide alternative learning experiences and enable students to explore learning through their senses with teacher support (Renelle., 2022). The multisensory approach helps students learn letter sounds (Moustafa, A., 2020). Multisensory learning improves the academic development of students with dyslexia and provides educators with insight so they can implement effective strategies in subsequent classes (Romaine, 2023). Understanding a person's sensory processing capacity is an important first step in maximizing the benefits of intervention (Piller et al., 2025).

Advances in educational technology have brought various innovations to the learning process (Asril et al., 2025). For example, multimedia applications are a form of technology-based learning that allows children to learn through a combination of text, sound, animation, and video designed according to their needs. The application of multimedia tutorials can help students with dyslexia improve their reading skills (Pujangga et al., 2024). This research is important because, although multisensory learning has been recommended in special needs education, its implementation in special needs schools is still limited and has not been optimally integrated with multimedia technology. Amidst the demands for digital transformation in education, the limited use of multimedia tutorials has the potential to hinder the engagement and academic understanding of students with learning disabilities (Zhadlenko et al., 2025) (Navas-Bonilla et al., 2025). Therefore, this research is important as a contextual empirical study that describes the actual conditions of multisensory learning and the responses of teachers and students to the use of multimedia tutorials in SNS environments.

Although the theoretical foundations and empirical evidence indicate the great potential of multimedia-enriched multisensory learning, few studies have examined the implementation of multisensory tutorial multimedia in the context of special schools (SNS), particularly from the perspective of practical application and the perceptions of teachers and students in special schools across various cultural countries, including Indonesia. Recent local research highlights the need for adaptive multisensory media for students with dyslexia at the

elementary school level (Susiawati & Angko Wildan, 2020), but applied evidence documenting the process of socialization, school readiness, and user responses (teachers & students) to tutorial multimedia remains limited. In other words, while the effectiveness of multisensory components and audiovisual aspects has been supported, the gap in research lies in implementation studies that examine the feasibility, acceptance, and challenges of using multisensory tutorial multimedia in SNS environments.

Initial observations at SNS Pembina Pekanbaru indicate that academic learning still relies on manual, multisensory methods such as letter cards, concrete objects, and printed images. Although computers and projectors are available, multimedia tutorial-based multisensory learning has not been systematically implemented in the learning process (Zou et al., 2025) (Murillo-Jiménez et al., 2025). Given these conditions, the researcher implemented a multimedia, tutorial-based, multisensory academic learning program as an innovative approach to support students with learning disabilities. Interactive, video-based multimedia tutorials were chosen because they can be adjusted to students' learning speeds, increase active engagement, present material in a more interesting way than conventional methods, strengthen conceptual understanding, and allow for repetition of material according to each student's learning needs. This study aims to describe the implementation of multisensory academic learning based on multimedia tutorials at SNS Pembina Pekanbaru and analyze students' and teachers' responses to its application in supporting the academic learning of children with special needs.

RESEARCH METHOD

This study employed a quantitative descriptive approach to describe the responses of teachers and students to a multimedia, tutorial-based, multisensory academic learning program at SNS Pembina Pekanbaru. Based on Winarno, a quantitative approach was employed since the data were collected in the form of questionnaire responses and analyzed using descriptive statistics (averages and percentages) (Vega Mareta Sceisarriya et al., 2022). This research was conducted at SNS Pembina Pekanbaru, which is located at 46 Jalan Segar, Rejosari, Tenayan Raya, Pekanbaru. The study took place from April to June of 2025.

This study used purposive sampling because the characteristics of the research subjects had to align with the study's objectives. The subjects were students with mild to moderate learning disabilities who participated in basic academic learning (introduction to letters and numbers) and were able to respond to visual and auditory stimuli. They also participated in multimedia tutorial-based multisensory learning sessions during the study.

Meanwhile, teachers must have at least one year of teaching experience at a special needs school and be directly involved in implementing multimedia tutorial-based multisensory learning in classes with students with learning disabilities. Not all students and teachers at SNS have the necessary experience or readiness to participate in multimedia learning. Therefore, random sampling could produce data that is not representative of the phenomenon being studied. Therefore, purposive sampling was considered the most appropriate method to ensure respondents were truly involved and understood the context of the learning being studied.

Data were collected to answer research questions and fulfill research objectives. The data can be described as follows: Research population and sample, the population consists of all 310 students and 71 teachers at SLBN Pembina Pekanbaru. Purposive sampling was used to select subjects based on the research objectives, resulting in a sample size of 10 students and 5 teachers. Teachers who were directly involved in the teaching process and 10 students with initial reading and writing skills. The teacher respondents had 3–15 years of teaching experience and were accustomed to applying a manual multisensory approach, while the students involved were learners with special educational needs at the early academic learning stage. These characteristics are important for understanding the context of how tutorial multimedia is applied to groups with diverse pedagogical needs.

The instruments were developed based on a review of multisensory learning theory, multimedia learning principles, and literature on special needs education. The items were

formulated to represent the ease with which the material can be delivered, student engagement and focus, the suitability of the media for the learning needs of children with special needs, and the potential application of multimedia tutorials in special needs schools. The indicators were developed based on the Cognitive Theory of Multimedia Learning (Mayer, 2024), multisensory learning, and differentiated learning for students with learning disabilities.

Table 1. Indicators of the Multisensory Multimedia Tutorial Learning Questionnaire.

No	Student Indicators	Teacher Indicators
1	Easy-to-understand media	Media that suits students' needs
2	Attractive appearance	Can help the learning process
3	Audio and visuals that aid understanding	Easy to use and understand
4	Fun activities in the video	Increases student attention
5	Media that makes learning more exciting	Can be used in daily learning activities

Based on the above indicators, 10 questions were translated into a questionnaire. The questionnaire was filled out by students and teachers. The questionnaire is as follows:

Table 2. Student Response Questionnaire Instrument to Multimedia Tutorials

No.	Statement	1	2	3	4	5
1	I enjoy learning using interactive videos and images.					
2	Multimedia tutorials help me understand lessons more easily.					
3	I am more enthusiastic about learning when using these learning media.					
4	The sounds and images in multimedia make lessons more interesting.					
5	I can study longer without getting bored quickly.					
6	This media helps me remember lessons longer.					
7	I can study on my own with the help of multimedia tutorials.					
8	I can answer questions after watching educational videos.					
9	Multimedia tutorials make me more confident in my studies.					
10	I would like to see more learning with media like this.					

Table 3. Teacher Response Questionnaire Instrument to Multimedia Tutorials

No.	Statement	1	2	3	4	5
1	Multimedia tutorials help teachers deliver material more easily.					
2	Students appear more enthusiastic when using this media.					
3	This media is suitable for the learning needs of children with special needs.					
4	The combination of audio, visuals, and text helps improve student focus.					
5	This media facilitates differentiated learning for students with learning disabilities.					

6	The use of multimedia tutorials saves time in explaining material.					
7	This medium enhances interaction between teachers and students.					
8	Students show improved understanding after using this medium.					
9	I feel motivated to create or use similar media.					
10	Multimedia tutorials are worth implementing regularly in special needs schools.					

Next, questionnaires were distributed to teachers and students. The data was then analyzed by calculating the average score of the respondents' answers using the formula. The following table shows the respondents' scores using a 1-5 Likert scale (strongly disagree to strongly agree) and the analysis calculating the average score (Arikunto, 2020):

Table 4. Score Range Interpretation

Score Range	Category
5	Strongly Agree
4	Agree
3	Neutral
2	Disagree
1	Strongly Disagree

The procedure for researching a multimedia, tutorial-based, multisensory academic learning program for children with special needs with learning disabilities began with identifying problems through observations and interviews with special education teachers to determine multisensory learning conditions. This was followed by a needs analysis at SNS Pembina Pekanbaru, which included socialization and media introductions, student and teacher questionnaire administration, quantitative data analysis, and finally, conclusion and recommendation provision (Mauvidar et al., 2024), here is the explanation:

a. Problem identification & literature review, identify learning problems in children with special needs (students have difficulty recognizing letters/numbers). Review theories related to multisensory learning, tutorial multimedia, and special education.
b. Selection of existing multimedia tutorial application. Determine the tutorial multimedia application to be used (educational games, learning letters and numbers), prepare a questionnaire for teacher and student responses. Prepare observation sheets.
c. Observation of learning activities using multimedia tutorials as a part of regular classroom practice. Teachers used multimedia tutorial applications in learning activities. Students learned to recognize letters/numbers using the available features, and the duration of use could be adjusted. There was no control group, no pretest–posttest, and no measurement of cause-and-effect effectiveness, only one or several uses as learning experiences. This was necessary because the research subjects were students with special needs.
d. Data collection. Collecting teacher responses through questionnaires and student responses (through observation and simple pictorial questionnaires).
e. Data analysis, conclusions & recommendations. Processing questionnaire data (average scores, percentage interpretation), explaining the responses of teachers & students, concluding whether the application is useful and suitable for students with special needs and providing usage recommendations for schools or future researchers.

Table 5. Research Procedure Stages

Stages	Activities
Problem identification & literature review	Initial observations and interviews with special needs teachers to determine the status of multisensory learning
Selection of existing multimedia tutorial application	Observation of learning activities using multimedia tutorials as a part of regular classroom practice
Observation of learning activities	Using the tutorial multimedia application in the learning activities
Data collection	Collecting teacher and students responses through questionnaires
Data Analysis, conclusions and recomendation	Processing questionnaire data, explaining the responses, concluding whether the application is useful and suitable for students with special

RESULTS AND DISCUSSION

RESULT

The Results of Implementing Multisensory Learning Based on Multimedia Tutorials

The results of implementing multisensory academic learning based on multimedia tutorials show that learning activities can be carried out well at the SNS Pembina Pekanbaru. Multimedia tutorials are used as a supporting medium in learning letters and numbers, utilizing a combination of visual, audio, and simple interaction elements. During the learning activities, students were able to follow the instructions presented in the media and respond to the visual and audio stimuli provided (application display as follows):

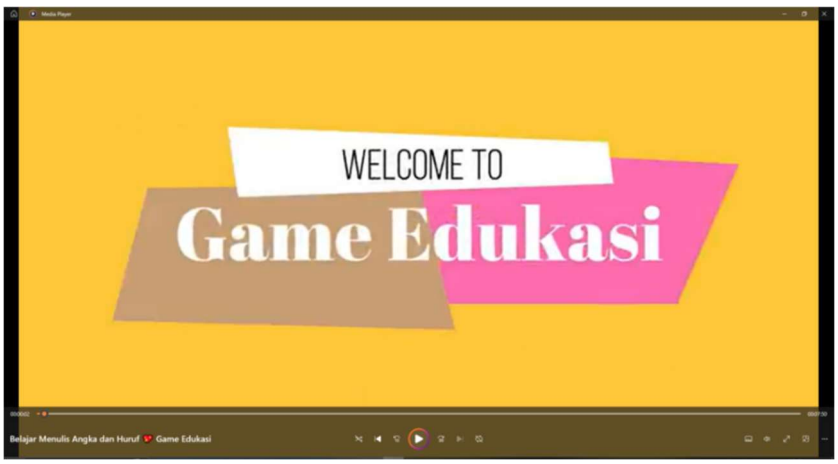

Figure 1. Educational Game Display

Observations during implementation showed that most students showed increased attention to the learning material. Students appeared to be more focused on the screen display, responded to the pronunciation of letters and numbers, and tried to follow the interactive activities provided. The repetition of material available in the multimedia tutorial allowed students to understand concepts gradually according to their individual abilities.

From the teachers' perspective, the implementation of learning with the help of multimedia tutorials is considered to assist in the delivery of material. Teachers can use media as a primary tool to introduce letters and numbers, while the role of teachers is more focused on individual guidance and reinforcement. The use of multimedia tutorials also helps to create a more structured and engaging learning environment for students with special needs.

Overall, multisensory academic learning based on multimedia tutorials can be effectively implemented as part of learning activities in special needs schools. This media serves as a supporting tool that facilitates student engagement and assists teachers in managing academic learning in accordance with the characteristics of students with special needs.

Student Response to Multimedia Tutorial Based Multisensory Learning

The respondents in this study consisted of ten students with learning disabilities from the SDLB levels (grade 2-4). The following is the student respondent data:

Table 6. Data of Students

No	Grade (Class)	Age (year)	Amount (people)
1	2	6	6
2	3	7	4
3	4	10	1

The results of the student questionnaire analysis showed an average score of 4.2, which is in the very high category. This score indicates that most students responded positively to the use of multimedia tutorials in learning letters and numbers. In particular, students showed interest in colorful visual displays, the sounds of letters and numbers, and interactive activities presented in the media. The following is a summary table of questionnaire data from 10 students:

Table 7. Recapitulation of Scores from 10 Student Respondents

No	Respondents	Average Score	Category
1	Student 1	4,6	Very Good
2	Student 2	4,4	Very Good
3	Student 3	4,2	Good
4	Student 4	4,3	Very Good
5	Student 5	4,1	Good
6	Student 6	4	Good
7	Student 7	4,5	Very Good
8	Student 8	3,9	Good
9	Student 9	4,4	Very Good
10	Student 10	4,3	Very Good
	Average	**4,2**	

The results of descriptive statistical analysis show that student responses to multimedia tutorial-based multisensory academic learning were in the good to very good category, with an average score of 4.2 and a standard deviation of 0.22, indicating that student

perceptions were relatively homogeneous, thus demonstrating consistency in responses to the use of multimedia tutorials in learning.

Teacher Responses to Multimedia Tutorial Based Multisensory Learning

Five teachers who teach academic subjects at SSN Pembina Pekanbaru participated, with the following data:

Table 8. Data of Teachers

No	Teacher's data	Amount	
1	Civil Servant	5	0
2	Certified	4	1

Teachers' responses to the use of multimedia tutorials also showed very positive results, with an average score of 4.52 (very high category). Teachers assessed that multimedia tutorials facilitated the delivery of material, saved time in explanations, and increased student engagement during learning. In addition, teachers viewed this media as suitable for the characteristics of children with special needs and supportive of differentiated learning.

Table 9. Recapitulation of Scores from 5 Teacher Respondents

No	Respondents	Average Score	Category
1	Teacher 1	4,8	Very Good
2	Teacher 2	4,6	Very Good
3	Teacher 3	4,5	Very Good
4	Teacher 4	4,3	Very Good
5	Teacher 5	4,4	Very Good
Average		**4,5**	

The results of descriptive analysis show that teachers' responses to multimedia tutorial-based multisensory academic learning were in the excellent category (M = 4.5 ; SD = 0.19). The relatively small standard deviation value indicates that teachers' perceptions of the use of multimedia tutorials tend to be homogeneous and consistent.

Correlation Between Teacher and Student Responses

The correlation between student and teacher responses shows that multisensory-based multimedia tutorials are not only attractive to students, but also practical and functional for teachers. Students experience learning that is more enjoyable and easier to understand, while teachers obtain media support that aids in the implementation of academic learning. This integration of responses reinforces the argument that multimedia tutorials can serve as an alternative solution in overcoming the limitations of learning technology implementation in special schools. These findings expand on previous research by providing empirical evidence in the context of special education in Indonesia, particularly at the special school level.

These results directly address the research objective, which is to describe how multimedia tutorial-based multisensory academic learning is received by students with special needs. The positive responses from the students indicate that this approach is feasible to be used as an alternative or supplement to conventional learning in special schools, particularly in teaching basic literacy and numeracy. As a result, this medium is an effective academic learning tool that supports a multisensory approach. It can serve as a model for adaptive digital

learning in other special schools and open up opportunities for teacher training in developing inclusive digital media.

However, this study has several limitations. The sample size was small (10 students and 5 teachers), and the sample does not represent the entire SNS population. Additionally, the measurements were based on perceptions and questionnaires rather than direct learning outcomes. Furthermore, the multimedia tutorials were only introduced in a few meetings, and the study was not conducted over a long period of time.

DISCUSSION

The Results of Implementing Multisensory Learning Based on Multimedia Tutorials

The results of the study indicate that the implementation of multisensory learning based on multimedia tutorials is in the very good category. This finding indicates that the use of multimedia tutorials that integrate visual, auditory, and kinesthetic elements can create a learning process that is easily understood by students with special needs. Theoretically, this finding is in line with the Cognitive Theory of Multimedia Learning proposed by Mayer (Mayer, 2024), which states that learning will be more effective when information is presented through various sensory channels in an integrated manner. A multisensory approach allows students to process information through more than one cognitive pathway, thereby reducing cognitive load and improving conceptual understanding. Multimedia-based multisensory learning can improve the focus, engagement, and academic understanding of students with special needs, especially in learning environments that require instructional differentiation

Thus, the implementation of multimedia tutorials not only serves as a supporting medium but also as a relevant learning strategy in the context of inclusive education and digital transformation.

Student Response to Multimedia Tutorial Based Multisensory Learning

Students' positive responses to multisensory academic learning based on multimedia tutorials indicate that a multisensory approach combined with multimedia tutorials can meet the learning needs of children with special needs, who retain more information if the interface is enhanced through multisensory materials including auditory and visual. This is in line with research (Di Fuccio et al., 2024) that multisensory learning based on multimedia tutorials provides a more adaptive learning experience and is appropriate to the characteristics of children with special needs. The integration of visual, audio, and interactive elements allows students to better understand academic material. By combining visual and audio elements, multimedia tutorials help reduce students' cognitive load and increase concentration during the learning process.

Teacher Responses to Multimedia Tutorial Based Multisensory Learning

Teacher responses to the implementation of multisensory learning based on multimedia tutorials were also positive. Teachers assessed that multimedia tutorials helped explain material more clearly, engagingly, and systematically, and facilitated adaptation of learning to the needs of students with special needs. This finding supports the principles of multimedia learning proposed by Renelle, namely that learning is more effective when information is presented through integrated visual and auditory channels. For teachers, multisensory learning is an educational approach in which various sensory cues provide students with alternative experiences with concepts (Renelle & Jones, 2022). The use of multimedia in special education can enhance teaching effectiveness, with multimedia tutorials serving as learning aids that reduce reliance on verbal explanations alone. This medium provides consistent visual and audio examples, allowing teachers to focus more on individualized guidance for each student.

Correlation Between Teacher and Student Responses

The results of the correlation analysis showed a significant relationship between teacher responses and student responses to multisensory learning based on multimedia tutorials. This indicates that the more positive the teacher's perception and readiness in using multimedia tutorials, the more positive the student's response to the applied learning. This finding supports the results of previous research Renelle and Di Fuccio, which stated that teacher attitudes and competencies in utilizing learning technology have a direct influence on the effectiveness of learning and student engagement. Teachers who understand the benefits and how to use multimedia tutorials optimally tend to be able to create a more interactive learning atmosphere and support the learning needs of students with special needs. Thus, the success of multisensory learning based on multimedia tutorials is not only determined by the quality of the media, but also by the role of the teacher as the main user of the media. Synergy between teacher and student responses is a key factor in improving the quality of technology-based inclusive learning.

CONCLUSION AND RECOMMENDATIONS

In general, the results of the study show that the multisensory learning approach supported by multimedia tutorials was well received by students and teachers at SNS Pembina Pekanbaru. This approach is considered to increase learning engagement, facilitate understanding of basic academic material, and support a more interesting and meaningful learning process for students with learning disabilities. These findings indicate that the use of multimedia tutorials that integrate visual, auditory, and interactive elements is in line with the learning characteristics of children with special needs. Therefore, multimedia tutorial-based multisensory academic learning has the potential to be a relevant supporting approach in the context of special education, especially for the introduction of letters and numbers.

Although this study provides a positive preliminary picture, there are several limitations. The relatively small sample size and limited coverage of only one school restrict the generalizability of the findings. In addition, the short implementation period of the multimedia tutorial and reliance on data based on student and teacher perceptions hinder objective assessment of academic improvement. Given these limitations, future research should use a larger sample size, a longer implementation period, and a research design that allows for quantitative measurement of learning outcomes. Future research could also explore the development of multimedia tutorials that can adapt to the diverse needs of individual students and test their effectiveness on categories of students with different special needs.

REFERENCES

Anjarsari, 2018. (2021). Penyelenggaraan Pendidikan Inklusif pada Jenjang SD,SMP, dan SMA di Kabupaten Sidooarjo. *Jurnal Pendidikan Inklusi*, *32*(3), 167–186. https://doi.org/https://journal.unesa.ac.id/index.php/ji/article/view/2585/1687

Arifin, F., Supena, A., & Fauzan, F. (2024). Analysis of A Systematic Literature Review on Dyslexia in Children. *Scaffolding: Jurnal Pendidikan Islam Dan Multikulturalisme*, *5*(2), 1083–1097. https://doi.org/10.37680/scaffolding.v5i2.3108

Asril, E., Zamzami, Z., Yunefri, Y., Novendra, R., & Turnandes, Y. (2025). Exploring the Relationship Between Gadget Use and Learning Focus in Children with ADHD in Inclusive Schools. *AL-ISHLAH: Jurnal Pendidikan*, *17*(3). https://doi.org/10.35445/alishlah.v17i3.8318

Dağlı Gökbulut, Ö., Gökbulut, B., & Yeniasır, M. (2024). The Perceptions and Attitudes of Peers towards Students with Special Needs as Reflected by Their Drawings and the Social Acceptance Scale. *Education Sciences*, *14*(4). https://doi.org/10.3390/educsci14040346

Di Fuccio, R., Kic-Drgas, J., & Woźniak, J. (2024). Co-created augmented reality app and its impact on the effectiveness of learning a foreign language and on cultural knowledge. *Smart Learning Environments*, *11*(1). https://doi.org/10.1186/s40561-024-00304-x

Faruq, F., & Pratisti, W. D. (2022). Model Pembelajaran Multisensori bagi Anak Disleksia, Efektif?: Tinjauan Sistematis. *Ideguru: Jurnal Karya Ilmiah Guru*, *7*(3), 243–248. https://doi.org/10.51169/ideguru.v7i3.392

Knoop-van Campen, C. A. N., Segers, E., & Verhoeven, L. (2020). Effects of audio support on multimedia learning processes and outcomes in students with dyslexia. *Computers and Education*, *150*(February), 103858. https://doi.org/10.1016/j.compedu.2020.103858

Mauvidar, E., Tinggi, S., Kesehatan, I., & Aceh, M. (2024). *Pengaruh Media Sosial dalam Peningkatan Kesiapsiagaan dan Respon Bencana pada Mahasiswa Words The Influence of Social Media on Improving Disaster Preparedness and Response Among Students : A Case Study at STIKES Muhammadiyah Aceh*. 41–53.

Mayer, R. E. (2024). The Past, Present, and Future of the Cognitive Theory of Multimedia Learning. *Educational Psychology Review*, *36*(1), 1–25. https://doi.org/10.1007/s10648-023-09842-1

Moustafa, A., et al. (2020). The Effectiveness of a Multi Sensory Approach in Improving Letter- Sound Correspondence among Mild Intellectual Disabled Students in State of Kuwait. *Journal of Education and Practice*, *7*(32), 151–156.

Murillo-Jiménez, H., Centeno-Alarcón, M., Buele, J., & Yumbla, F. (2025). Analyzing barriers to the effective implementation of technological tools in inclusive education: a scoping review. *Frontiers in Education*, *10*(November), 1–12. https://doi.org/10.3389/feduc.2025.1687664

Navas-Bonilla, C. del R., Guerra-Arango, J. A., Oviedo-Guado, D. A., & Murillo-Noriega, D. E. (2025). Inclusive education through technology: a systematic review of types, tools and characteristics. *Frontiers in Education*, *10*(February). https://doi.org/10.3389/feduc.2025.1527851

O'Brien, J, et al. (2023). *Can We Train Multisensory Integration in Adults? A Systematic Review*. Pubmed. https://doi.org/10.1163/22134808-bja10090

Piller, A., McHugh Conlin, J., Glennon, T. J., Andelin, L., Auld-Wright, K., Teng, K., & Tarver, T. (2025). Systematic review of sensory-based interventions for children and youth (2015–2024). *Frontiers in Pediatrics*, *13*(November), 1–11. https://doi.org/10.3389/fped.2025.1720179

Pujangga, M. A. G., Widowati, R. D., & AzamiMochammad Imron. (2024). Technology-Assisted Reading Interventions For Students With Dyslexia: Descriptive Qualitative Research Mohammad Aziro Gofa Pujangga 1 , Diah Retno Widowati 2 , Mochammad Imron Azami 3. *JIM Unisma*, *19*(25), 1–16. https://jim.unisma.ac.id/index.php/jp3/article/view/25975?utm_source=chatgpt.com

Pulliam, G., Feldman, J. I., & Woynaroski, T. G. (2023). Audiovisual multisensory integration in individuals with reading and language impairments: A systematic review and meta-analysis. *Neuroscience and Biobehavioral Reviews*, *149*. https://doi.org/10.1016/j.neubiorev.2023.105130

Renelle, Amy., jones, R. (2022). Multisensory Learning for Students With Disabilities. *Bridging the Gap: Empowering and Educating Today's Learners in Statistics*.

https://doi.org/10.52041/iase.icots11.T11A1

Renelle, A., & Jones, R. (2022). *Multisensory Learning for Students With Disabilities*. *11*, 1–6. https://doi.org/10.52041/iase.icots11.t11a1

Romaine, A. (2023). The Role of Multi-Sensory Learning in Elementary Classrooms on Student Development. *Undergraduate Review*, *17*, 2023. https://vc.bridgew.edu/undergrad_rev/vol17/iss1/9

Silitonga, T; Purba, Y; Munthe, H; Herlina, E, S. (2023). Karakteristik Anak Berkebutuhan Khusus. *Jurnal Pendidikan Sosial Dan Humaniora*, *7*(2), 33–48. http://repository.radenintan.ac.id/11375/1/PERPUS PUSAT.pdf%0Ahttp://business-law.binus.ac.id/2015/10/08/pariwisata-syariah/%0Ahttps://www.ptonline.com/articles/how-to-get-better-mfi-results%0Ahttps://journal.uir.ac.id/index.php/kiat/article/view/8839

Susiawati, I., & , Angko Wildan, D. M. (2020). Jurnal basicedu. Jurnal Basicedu,. *Jurnal Basicedu*, *5*(5), 3(2), 524–532. https://journal.uii.ac.id/ajie/article/view/971

UNICEF. (2020). Inclusive Education: Including children with disabilities in quality learning: what needs to be done? *Unicef*, *September*, 194–201.

Vega Mareta Sceisarriya, Aries Irsan Rofiq, & Khamim Hariyadi. (2022). Pengembangan Multimedia Interaktif sebagai Media Pembelajaran Pencak Silat untuk Siswa Kelas V di SD Negeri 7 Pule. *SPRINTER: Jurnal Ilmu Olahraga*, *3*(3), 235–239. https://doi.org/10.46838/spr.v3i3.234

Zhadlenko, I., Morenko, O., Nikolenko, L., Lastochkina, O., & Mykytenko, M. (2025). Digital transformation of education as a space for supporting learners with special needs — challenges and prospects for inclusion. *Seminars in Medical Writing and Education*, *4*. https://doi.org/10.56294/mw2025704

Zou, Y., Kuek, F., Feng, W., & Cheng, X. (2025). Digital learning in the 21st century: trends, challenges, and innovations in technology integration. *Frontiers in Education*, *10*. https://doi.org/10.3389/feduc.2025.1562391