

Development of Visual Perception Assessment in the Form of an Interactive Digital Book for Students with Mental Disabilities

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Abstract: Children with special needs will achieve good learning outcomes if educators conduct assessments. Assessment is a process to collect information about abilities, advantages and needs that will be used as considerations and decisions related to the preparation of academic programs. This study aims to develop a visual perception assessment product in the form of a digital book for students with intellectual disability which is expected to be able to measure the ability, difficulty and needs in aspects of the development of children's visual perception with cases of mental impairment needed as consideration in planning learning programs, especially in reading learning. The method used in this study adapts the Research and Development method initiated by Borg & Gall. The validity of the resulting product is calculated by Aiken's V formula which compared with the table r value (0.78) obtained a material validity value of 0.95 (very valid), a media validity of 0.90 (very valid) and a system validity of 0.91 (very valid). The reliability of the products developed proved to be reliable and consistent based on the Cronbach Alpha test which obtained a value of 0.744, higher than the minimum Cronbach Alpha score limit of 0.60. The implementation of the assessment by students with mental disabilities obtained a score of 96.9%, meaning that the product can be used very well. Based on the results of this study, the visual perception assessment in the form of interactive digital books for students with intellectual disability that have been developed is suitable for use.

Keywords: assessment, intellectual disability, interactive digital, visual perception.

INTRODUCTION

Children with special needs are children who are different from children in general because they experience obstacles in growth and development so that they experience problems in cognitive, hearing, vision, motor and socialization. For this reason, they need special assistance or services to help growth and development according to their potential (Hallahan et al., 2014; Putri et al., 2021)

Children with mental disabilities are one of the children with special needs. Mental impairment is a disorder experienced during the developmental period or before the age of 18 that includes deficits in intellectual and adaptive and adaptive functions in the conceptual, social, and practical domains (Swedo, 2013; Putri et al., 2022; Suprotun & Andriyani, 2022). To be able to carry out their developmental duties, children with mental disabilities need special assistance or services (Pamuladsih et al., 2022), including in the field of education (Yunianti et al., 2019). One of the problems faced by children with mental disabilities in the academic field is the problem of reading.

The use of picture cards and word cards as a medium for reading learning is a common thing to do among teachers, including to teach early reading and functional reading. Both are an inseparable part as a learning medium. In other words, learning media is an integral part of the whole system and learning process, meaning that learning media is the most influential and decisive element in learning activities (Subasno et al., 2021, 2022). Reading is a fundamental basic skill that students must learn in order to understand other lessons because through

reading a person can get the information needed and support in language and communication (Marlina, 2015). Many studies have shown that failure to learn to read in children with mental disabilities starts from the prerequisites for readiness to learn to read as a contributing factor. Visual perception has a strong influence as a prerequisite on reading skills. This view is built on the assumption that reading is more related to language symbols and symbols (alphabet) (Rochyadi, 2010).

Visual perception is the ability to recognize, distinguish and interpret a visual stimulus in the form of symbols that enter through the sense of sight and relate it to information that has been stored in the brain (Astria & Rochyadi, 2016), (Nabilah et al., 2018), (Abianti et al., 2000). According to Lerner in Abdurrahman, (2012) there are 5 types of visual perception that play a strong role in reading, namely: 1) spatial relations, 2) Visual discrimination, 3) objects and backgrounds (figure and ground), 4) Visual closure (visual Closure, 5) remembering (visual memory).

Assessment is a step of measurement and assessment to determine the obstacles or ability of visual perception in children with mental disabilities as a reference for reading learning. Until now, there have not been many visual perception assessment instruments for students with mental disabilities that are standardized and widely used. This has resulted in teachers who work with students with special needs, especially children with mental disabilities, not assessing visual perception as a condition of reading maturity. In fact, this visual perception assessment is needed by teachers to find out students' basic abilities in reading (Inas, 2018)

Responding to these problems, researchers develop visual perception assessments based on the scope and lattice of instruments based on theoretical studies and research that have been carried out previously. Assessment products will be developed by researchers by utilizing information and communication technology so that they are easily accessed by anyone and wherever they are. The development of this research resulted in a product in the form of an interactive digital book as an assessment tool that aims to make the assessment implementation interactive, so that students with mental disabilities do not experience burnout during the assessment process. Interactive or electronic digital is a book display that is in digital form and is supported by multimedia elements in the form of text, images, sound, animation, and video and can be accessed by users through electronic media, such as smartphones and tablets (Prasetya, 2015). The use of ICT (Information and Communication Technology) in the world of education is already a necessity, including in Extraordinary Schools, slow or fast integrase ICT as an interactive learning medium must also be carried out. The results of the study proved that the use of interactive media in children with special needs has proven to be more effective (Indra et al., 2019).

The objectives of this study are (1) Compiling a visual perception assessment in the form of an interactive digital book for students with disabilities, (2) Testing the validity of visual perception assessment development products in the form of interactive digital books for students with mental disabilities, (3) Testing the reliability of visual perception assessment development products in the form of interactive digital books for students with disabilities, (4) Producing the final product of visual perception assessment in the form of interactive digital books for students with mental impairments.

METHOD

The Research and Development (R&D) model with stages from Borg and Gall was used in this study. Researchers make modifications into 7 steps, namely: (1) Potential and problems (Preliminary study), (2) Product design, (3) Product design validation test [(material experts, learning media experts, and systems experts (information and communication technology), (4)

Product design revisions, (5) Product trials (practitioner tests), (6) Product implementation trials, (7) Product revisions

In this study, researchers want to examine whether the development of visual perception assessment products in the form of interactive digital books for students with mental disabilities that are developed is valid, reliable and can be used. In measuring material validation, media and assessment product development systems researchers ask experts in the field of assessment, media and ICT to assess the assessments developed and measured using Aiken's V. Meanwhile, to measure the reliability of the assessment carried out by the teacher, it was measured by SPSS to see the Cronbach Alpha score and the implementation test in students was calculated using percent.

RESULT AND DISCUSSION

Result(s)

Material validation is carried out with the aim of assessing the feasibility of the material used in the product whether it meets the feasibility or not. The validation test was carried out by 6 validators who are competent in the field of assessment and children with special needs. Validators provide assessments using an assessment format consisting of 10 questions or indicators about the material in the visual perception assessment. The validators' values are processed using the Aiken's V formula which sets a validity value of 0.78 for validators or raters totaling 6 people with the highest answer score of 4. Based on the results of the Aiken's V test, an average value of 0.94 was obtained; then $0.94 > 0.78$. Thus, the visual perception assessment material in the form of an interactive digital book for students with mental disabilities is declared valid. The results of the analysis can be seen in the table below:

Table 1. Processing and Analysis of Material Expert Test Data

No	Indicator	V1	V2	V3	V4	V5	V6	$\sum s$	n(c-1)	Aiken's V	Remark
<i>The validity value on Table Aiken's V for 6 ratters (validators) is 0.78</i>											
1	Item-1	4	4	4	4	4	4	18	18	1,00	Valid
2	Item-2	3	3	4	3	4	4	14	18	0,78	Valid
3	Item-3	3	4	4	4	4	4	17	18	0,94	Valid
4	Item-4	4	4	4	4	4	3	17	18	0,94	Valid
5	Item-5	3	4	4	4	4	4	17	18	0,94	Valid
6	Item-6	3	4	4	4	4	4	17	18	0,94	Valid
7	Item-7	4	4	4	3	4	3	16	18	0,88	Valid
8	Item-8	4	4	4	4	4	4	18	18	1,00	Valid
9	Item-9	4	4	4	4	4	4	18	18	1,00	Valid
10	Item-10	4	4	4	4	4	4	18	18	1,00	Valid
Average										0,94	Valid

Media validation is carried out with the aim of providing an assessment of the development of visual perception assessment products in the form of interactive digital books for students with mental disabilities from the perspective of learning media. The validation test was carried out by 6 validators who are competent in the field of learning technology and ICT. Validators provide assessments using an assessment format consisting of 10 questions or indicators about visual perception assessment media. The validators' values are processed using the Aiken's V formula which sets a validity value of 0.78 for validators or raters totaling 6 people with the highest answer score of 4. Based on the results of the Aiken's V test, an average value of 0.90 was obtained; then $0.90 > 0.78$. Thus, the media in the visual perception assessment in the form of interactive digital books for students with mental disabilities is declared valid. The results of the analysis can be seen in the table below:

Table 2. Processing and Analysis of Media Expert Test Data

No	Indicator	V1	V2	V3	V4	V5	V6	$\sum s$	n(c-1)	Aiken's V	Remark
<i>The validity value on Table Aiken's V for 6 ratters (validators) is 0.78</i>											
1	Item-1	4	4	3	3	3	3	14	18	0,78	Valid
2	Item-2	4	3	4	4	4	3	16	18	0,89	Valid
3	Item-3	4	4	4	4	4	4	18	18	1,00	Valid
4	Item-4	4	3	4	4	3	4	16	18	0,89	Valid
5	Item-5	4	4	4	4	4	3	17	18	0,94	Valid
6	Item-6	4	3	4	4	4	3	16	18	0,89	Valid
7	Item-7	4	4	4	4	4	3	17	18	0,94	Valid
8	Item-8	4	3	4	3	4	4	16	18	0,89	Valid
9	Item-9	3	4	3	3	4	4	15	18	0,83	Valid
10	Item-10	4	4	3	4	4	4	17	18	0,94	Valid
Average										0,90	Valid

System Validation is carried out with the aim of providing an assessment of the development of visual perception assessment products in the form of interactive digital books for students with mental disabilities from a system perspective in information and communication technology. The validation test was carried out by 6 validators who are competent in the field of information and communication technology. Validators provide assessments using an assessment format consisting of 10 questions or indicators about visual perception assessment media. The validators' values are processed using the Aiken's V formula which sets a validity value of 0.78 for validators or raters totaling 6 people with the highest answer score of 4. Based on the results of the Aiken's V test, an average value of 0.91 was obtained; then $0.91 > 0.78$. Thus, the visual perception assessment product system in the form of interactive digital books for students with mental disabilities is declared valid. The results of the analysis can be seen in the table below:

Table 3. Processing and Analysis of System Expert Test Data

No	Indicator	V1	V2	V3	V4	V5	V6	$\sum s$	n(c-1)	Aiken's V	Remark
<i>The validity value on Table Aiken's V for 6 ratters (validators) is 0.78</i>											
1	Item-1	4	4	4	4	4	4	18	18	1,00	Valid
2	Item-2	3	4	4	4	4	4	17	18	0,94	Valid
3	Item-3	3	4	4	4	3	3	15	18	0,83	Valid
4	Item-4	3	4	4	4	4	4	17	18	0,94	Valid
5	Item-5	4	4	4	4	4	4	18	18	1,00	Valid
6	Item-6	3	4	4	3	4	4	16	18	0,88	Valid
7	Item-7	3	3	4	3	3	3	13	18	0,72	Valid
8	Item-8	4	3	4	3	4	3	15	18	0,83	Valid
9	Item-9	4	4	4	3	3	4	16	18	0,88	Valid
10	Item-10	4	4	4	4	4	4	18	18	1,00	Valid
Average										0,91	Valid

After the product developed is declared valid by material, media and system experts, the next step is for the researcher to test the reliability of the product. The media reliability test is carried out to determine the reliability or level of consistency in the development of visual perception assessment products in the form of interactive digital books for students with mental disabilities. The implementation of the reliability test by four teachers of SLB YPAC

Malang and four teachers of SLB C Autistic Negeri Kedung Kandang. The teacher will give an assessment of the questionnaire containing 10 questions or indicators about the visual perception assessment. Reliability analysis or testing will be carried out using Cronbach's Alpha formula which is processed using SPSS Software version 26. A Cronbach Alpha analysis states that a measuring instrument product can be said to be reliable when it meets the minimum Cronbach Alpha score limit of 0.6. The results of the analysis can be seen in the following table:

Table 4. Result of Product Reliability Test by Teachers

Reliability Statistics	
Cronbach's Alpha	N of Items
,744	10

Based on Table 4 it is seen that the resulting Cronbach Alpha value is 0.744 which is greater than 0.6. Therefore, visual perception assessment in the form of interactive digital books for students with mental disabilities which is a product in this study is declared reliable. The visual perception assessment implementation test in the form of an interactive digital book was carried out on four students with mental disabilities at SLB YPAC KOTA MALANG and four other students with mental disabilities at SLB C Autistic Negeri Kedung Kandang (KD) Malang. Assessment of the use of products in students is carried out by the teacher using an observation format that refers to the assessment on the Guttman scale and the results are analyzed using percent.

Table 5. Analysis of Product Trials in Students

No.	YPAC Student	Max Score	Result Score	Percent (%)	No.	Autist-KD Student	Max Score	Result Score	Percent (%)
1	T	80	70	87,5%	5	M	80	80	100%
2	V	80	70	87,5%	6	D	80	80	100%
3	R	80	80	100%	7	C	80	80	100%
4	A	80	80	100%	8	W	80	80	100%
	Result	80	75	93,8%		Result	80	80	100%

Based on Table 5 the results of the visual perception assessment trial analysis in the form of interactive digital books for mentally impaired students at SLB YPAC KOTA MALANG by 93.8% and students of SLB C Autistic Negeri Kedung Kandang by 100%. The average percentage of trial results for the implementation of assessments in students in both schools was 96.9%. Thus, referring to the criteria for determining the level of consistency and / or reliability of visual perception assessment products in the form of interactive digital books for students with mental disabilities, it can be declared very good qualifications, namely very consistent / reliable to be applied.

Discussion(s)

The preparation of this assessment product is based on the scope of visual perception which consists of: spatial relations, visual discrimination, shape and background discrimination, visual closure and visual memory (Abdurrahman, 2012; Yuwono, 2015) . Based on the scope above, the researcher compiles an assessment grid and develops the question items into a product of visual perception assessment development. The development of visual perception assessment products based on five scopes or dimensions, namely: spatial relations, visual

discrimination), figure and ground, visual closure) and visual memory is also strengthened by research previously conducted by Nabilah et al., (2018) on the development of visual perception instruments in elementary school students in grades 1 and 2 for children with learning difficulties with the consideration that the assessment is used as an initial test of initial reading learning ability.

Another researcher, Inas (2018), also developed a visual perception instrument based on the same five scopes for children with intelligence barriers at the junior high school level with an age of 10-14 years. The researchers reasoned by determining the criteria for children with intelligence barriers was because they had the potential to have academic ability and the selection of 10-14 years old was because at that age the maturity of visual perception was well developed.

Researchers developed a visual perception assessment for mildly impaired students who have difficulty reading, this is based on research that has been carried out by (Juhanaini & Eka, 2009) that by providing visual perception exercises can improve the initial reading ability of children with mental impairment. The development of this visual perception assessment is emphasized on mildly impaired students at the SDLB level with a range of 6-12 years based on the developmental theory that when the child is at the elementary school level the development of visual perception develops rapidly. With the development of visual perception assessment for students with mental disabilities at the elementary school level (SDLB), deficiencies in aspects of visual perception can be detected so that the prerequisites needed in reading can be handled properly.

Validators who are competent in the field of visual perception assessment and children with special needs, learning technology experts and technology and information experts validate materials, media and systems for the development of visual perception assessments in the form of interactive digital books for students with mental disabilities. Instrument sheets containing ratings, comments and suggestions are used by validators to assess product development.

The product material test was declared valid by six validators by providing an assessment of the concept, material, elaboration, presentation of the assessment flow, the suitability of the assessment questions with indicators and language aspects and was expressed with an Aiken's V value of 0.94. Validators state that the product is suitable for use with suggestions for improving the scope of spatial relations by replacing images according to objects already known to children, in the scope of visual discrimination (visual discrimination) changing color recognition indicators to recognize shaded objects, and in the scope of discrimination form and background (figure ground) with simplification of the question.

The validity test of the product media developed obtained an Aiken's V value of 0.94 by six validators. Product media validation of media about media appearance, presentation and design. Para media validator states that the product is worth using, with improvements. Researchers revised the display of the table of contents and assessment results. Based on product validation of compatibility, reliability, reusability, maintainable and creativity by 6 system validators obtained Aiken's V in the amount of 0.91 that the product is suitable for use, with a note that the product is tailored to the user.

The visual perception assessment reliability test in the form of an interactive digital book aims to see whether the product developed as a measuring tool can be declared reliable (reliable, consistent). The reliability test of this product development involved four teachers of SLB YPAC KOTA MALANG and four teachers of SLB C Autistic Negeri Kedung Kandang. The activity began with socialization of the use of assessment followed by the practice of visual perception assessment by the teacher. The next step is for teachers to provide an assessment of the product using an assessment format that contains 10 questions or indicators about visual perception assessment in the form of an interactive digital book on

students with mental disabilities. The results of the teacher's assessment were analyzed using Alpha Cronbach and obtained a coefficient of 0.744, higher than the minimum limit of Alpha Cronbach's score of 0.6 (Wiratna Sujarwesi, 2014). It can be concluded that the visual perception assessment in the form of an interactive digital book as a measuring tool can be declared reliable (reliable, consistent).

Through the observation sheet, the teacher gave an assessment of the reliability of the product when used by students and obtained an average result of 96.6 percent of the four students from SLB YPAC MALANG and four students from SLB C Autistic Negeri Kedung Kandang. Thus, the visual perception assessment in the form of an interactive digital book for students with mental disabilities was declared reliable on excellent qualifications. The implementation of the product implementation test begins with the introduction of how and the use of icon buttons in the visual perception assessment in the form of interactive digital books. In the implementation of the test, students will be accompanied by a teacher who plays a role in reading out the questions and helping students if they encounter difficulties in operating buttons or icons.

CONCLUSION

The resulting development product has an arrangement that contains 5 aspects or scopes of visual perception: a) Spatial Relations, b) Visual Discrimination, c) Figure and Ground Discrimination, d) Visual Closure, and e) Visual Memory.

The results of the validation test for visual perception assessment development products in the form of interactive digital books for students with mental disabilities were declared valid by material experts, media experts and systems experts. The results of the validity test were carried out using Aiken's V which obtained an average value of 0.92 for the material test, the media test obtained an average value of 0.94 and the system test obtained an average value of 0.91. The score is greater when compared to r the table Aiken's V = 0.78 (Aiken, 1985). Thus, the visual perception assessment in the form of an interactive digital book for students with mental disabilities is declared valid and suitable for use.

The results of the reliability test on visual perception assessment development products in the form of interactive digital books for students with mental disabilities by practitioners are declared reliable. Reliability testing was carried out using Cronbach's Alpha formula and reached a value of 0.74. The result is higher than the minimum Cronbach Alpha score limit of 0.60. The reliability of the products tested on students with mental disabilities had a presentation of 96.9%. Referring to the criteria for determining the level of consistency and / or reliability of visual perception assessment products in the form of interactive digital books for students with mental disabilities, it can be declared very good qualifications.

This development research resulted in a visual perception assessment product in the form of an interactive digital book in an e-pub format for students with mental disabilities. With the e-pub format, this digital book is more interactive and liked by children. This assessment can be operated on a smartphone, PC or laptop device.

Suggestion

Based on the results of research on the development of visual perception assessment in the form of interactive digital books for students with mental disabilities, suggestions can be given as follows:

For teachers, it is expected to conduct visual perception assessments and understand the development of children's visual perception so that they can provide exercises in the field of visual perception in accordance with the results of the assessment and follow the stage of development of children's visual perception to help prepare for reading learning, especially for students with mental disabilities.

For SLB schools, it is expected to use a visual perception assessment in the form of interactive digital books for students with mental disabilities at the beginning of school entrance and the assessment results can be used as input in compiling reading learning. To support this, schools are required to provide IT facilities and infrastructure so that every teacher can access and use this assessment.

For subsequent researchers, it is recommended to develop visual perception assessment products by adding materials or indicators so that the resulting product is more comprehensive. Furthermore, for the assessment to be more interactive, it is necessary to add sound effects so that children are more enthusiastic and motivated in conducting assessments.

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