DEVELOPING "I AM SMART" MEDIA FOR INCREASING LEARNING MOTIVATION OF STUDENTS WITH AUTISM SPECTRUM DISORDERS

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Abstract	The aim of this research was to develop "I Am Smart" media and evaluate its effectiveness in increasing the learning motivation of students with autism spectrum disorders. In order to accomplish this objective, this form of investigation was created. Consequently, the R&D model was utilized in this investigation. Potential problems, data collection, product design, design validation, product design revision, and trial use were the phases of the development model. Twenty autistic third-graders from SD Muhammadiyah 01 Tanjung Enim made up the sample for this investigation. This study's sample consisted of one pupil. The sampling method utilized was non-probability sampling. Observation, assessments, interviews, and questionnaires were employed as methods for data collection. This development research employs descriptive analysis, learning content analysis, and analysis of test results for its analysis. This study's primary data came from questionnaires, assessments, and interviews with field informants, so they conveyed pertinent information. These data were collected from students and their teachers. In this study, the secondary data were books, journals, and mass media about learning media. The average score for the "I Am Smart" media validation assessment by media experts was 90% (very valid), while the average score for the validation assessment by material experts was 80% (valid), and the average score for the validation assessment by field test experts was 87% (very valid). Based on these results, it can be concluded that the "I Am Smart" learning media is valid for use with students with autism. Before receiving "I Am Smart" learning media on the first to third trials, the subject received a score of 30; however, after receiving "I Am Smart" learning media, the subject demonstrated that "I Am Smart" learning media could help the subject increase in value by achieving the highest score of 75. According to the results of the initial trial and the results of the final trial, "I Am Smart" learning media effectively encourages or motivates students with autism spectrum disorders to engage in learning activities, making it appropriate for students with autism spectrum disorders.
Keywords	Autism, Learning Motivation, Learning Media, Primary School, SD Muhammadiyah 1 Tanjung Enim

INTRODUCTION

As a result of their nervous system disorders, students with autism spectrum disorders have distinct communication, interaction, and behavior skills from other students, as well as a negative impact on their language development (Wardhany et al., 2022). Autism is a characteristic of individuals with special needs who face complex developmental obstacles (Sari et al., 2021). Often, students with autism spectrum disorders have difficulty receiving educational materials (Maulida & Zulfitria, 2017). Students with autism spectrum disorders need media as a learning tool, especially media based on Information and Communication Technology (ICT) so that it can be accessed from various places (H. P.S. Muttaqin et al., 2021). ICT-based learning media are grouped into several forms, namely visual media, audial media, projected still media, and projected motion media (Sahid, 2018).

 "Media" comes from the Latin "media," which means "mediator" or "introduction" (Tafonao, 2018). Besides, Purwono et al. (2014) stated that learning media plays a crucial role in supporting the quality of the teaching and learning process. One of the learning media that is currently developing is audio-visual media (Tafonao, 2018). Learning media is an instrument that teachers can use to facilitate the delivery of messages (material) and information to students in order to make the learning process more effective and achieve learning objectives (Wardhani, 2022). Therefore, it can be concluded that learning media refers to instructional instruments that can stimulate students' attention, thoughts, emotions, and skills or abilities, thereby promoting the learning process. Using learning media that is adapted to the requirements of students with autism spectrum disorders will facilitate the learning process because it can aid in the delivery of material that is simpler for students with autism spectrum disorders to comprehend (Komarisa, 2020).

According to Winkel (2017), learning motivation encompasses everything associated with the utilization of learning activities, the maintenance of learning activities, the direction of learning activities, and the attainment of desired objectives. Every pupil has their own individual learning motivation. In general, there are two sources of motivation to learn: the intrinsic motivation of the students themselves and the motivation of non-students (Homdijah et al., 2023).

Teachers can keep students motivated by mentioning student learning objectives, awards, competition, pride, and punishment, inspiring students to learn, producing good learning norms, and assisting students individually or collectively who have cognitive difficulties; a variety of strategies are employed (Nursita et al., 2020).

Leo Kanner first proposed the concept of autism in 1943. This barrier is characterized by an inability to interact with others, and language barriers manifested as mastery delays, ecological barriers, silence, sentence inversion, repetitive and regimented play activities, strong memory pathways, and a compulsive desire to maintain order in the neighborhood. Autism is understood to be a severe disorder of neurobiological development affecting students' learning, communication patterns, position in the environment, social relationships, and ability to care for themselves (Kanner, 1943).

According to Article 1 of Law Number 31, every citizen has the right to education. Given that as many as 5,530 cases of ABK, specifically autism, were reported in Indonesia for the 2020–2021 period, In order for individuals with special needs (autism) to have access to quality education and realize their full potential (Indonesian Ministry of Health, 2022). In this regard, the Indonesian government has implemented inclusive education to provide facilities and rights for students with autism spectrum disorders. However, in the implementation of inclusive education, problems emerged that had to be faced by the school, namely first the teacher. The complaints felt by the teacher were the teacher's lack of patience in dealing with ABK students, the teacher's educational background that was not appropriate, the teacher's lack of understanding about ABK and inclusive education, difficulties in teaching and learning activities (KBM), a lack of teacher competence in handling ABK, and class accompanying teachers (GBK).

Both parents, complaints are that parents are impatient with ABK, the tolerance of regular students towards ABK is lacking, parents feel embarrassed, so they want to go to public schools, and parents' understanding of ABK is lacking. Primasari & Supena (2020) stated that the implementation of education is the responsibility of parents and the surrounding community, not only educational institutions.

The three students had the attitude of ABK, who could not follow the rules and thus disrupted the teaching and learning process, and ABK had difficulty following the subject matter. Fourth, school management, the complaint felt by school management is that the teaching and learning process has not run optimally (Rahmawati1 & Najib, 2022). These problems arise due to the teacher's lack of understanding of ABK and inclusive schools, so teachers experience difficulties in teaching and learning activities. This makes researchers want to help teachers who have difficulty teaching ABK students by making it easier to provide learning material that will be delivered.

In the process of teaching and learning, media are very underused by teachers because they do not understand the use and development of learning media and lack creativity and innovation in teaching (Halimah, 2018). SD 01 Muhammadiyah Tanjung Enim is an inclusive elementary school in which there are two students with autism spectrum disorders, one of whom has autism and the other has speech impairments.

The use of learning media in SD 01, Muhammadiyah Tanjung Enim, is very minimal and less effective. Based on the results of the pre-research, it was found that the data provided by the teacher was in the form of the last math test score. The results were not good because before the remedial program was carried out, as many as 11 students, or 55% of the total 20 students, scored below the minimum completeness score. And there are no learning media available that can increase the motivation of students with autism spectrum disorders to participate in learning activities in the classroom. Learning media is very underused by teachers because they do not understand the use and development of learning media and lack creativity and innovation in their teaching (Halimah, 2018). Based on initial observations with the school principal at SD 01 Muhammadiyah 01 Tanjung Enim, the learning motivation of students with autism spectrum disorders is still relatively low. This is due to several factors, namely that online learning makes students with autism spectrum disorders less likely to receive teacher guidance at school. Class III teachers at SD 01 Muhammadiyah during the COVID-19 pandemic only provided learning processes through reading, writing, and arithmetic (calistung), and the use of instructional media was underused, so the learning process was monotonous. This certainly affects student learning outcomes, both for normal students and ABK students.

In this regard, the learning process has a very unfavorable impact on students with autism spectrum disorders, which can cause them to often spend study time on things that are less productive and less focused on participating in learning because of their repetitive nature. Therefore, researchers are motivated to create ICT-based learning media called I Am Smart. This media will later be designed to include mathematics learning material.

Teachers can refer to the theory that humans can only absorb as much as 70% of learning material in choosing the right learning media. This amount is obtained if there are 50% audio-visual elements, namely learning media, that can be heard and seen during learning activities. The presentation of what can be seen and heard is divided into 30% visual elements and 20% audio elements (Ichsan & Iswari, 2019). This fact needs to be understood by the teacher to avoid the

teaching and learning process becoming boring if you only rely on written material.

According to Aprilia & Supriadi (2019), the development of mathematics learning media in the form of Pop-up boxes for students with autism spectrum disorders was carried out at Dharma Bhakti Pertiwi SLB by using respondents, namely media experts and Dharma Bhakti Pertiwi SLB students. This study obtained the results that the interpretation criteria were valid with media attractiveness tests and effective so that mathematics learning media in the form of Pop-up boxes could be effective for learning. According to Nazaruddin & Efendi (2018), The Book of Pop-Up Augmented Reality to Increase Focus and Object Recognition Capabilities for Students with Autism was held at SDLB Autism Laboratory UM. This study obtained the result that augmented reality pop-up books were able to increase students with autism spectrum disorders' appreciation of objects that were introduced to them. The indicators can be seen in increased interest in design, duration of observation, exploration of curiosity, mastery of message content, and communication when observing objects or things that are introduced to them.

According to Utami et al. (2017), developing illustrated story media for science subjects for third-grade students with autism spectrum disorders was carried out at SDN Pancawarno 3, Central Lampung Regency, using respondents from all third-grade students at SDN Pancawarno 3. This research shows that picture-story media products are very effective in teaching. According to Novia Isniawati (2020), the development of android-based social media stories for learning social interaction for students with autism was given by independent experts on social media stories obtaining good categories and can be tested on limited students. According to Rega et al. (2018), the research discusses how to improve the subject's skills to interact with the environment, specifically by increasing motivation. This research was taken from data from Google Scholar, PubMed, CiteSeerX, and IEEEXplore, with a total of 50 participants with an average age of 7 years. This study found that AR can enrich students' interaction with the school environment, with the note that technology should not be used to force information on students but rather as a way to allow students to open themselves to the world.

Based on the results of previous research, it can be said that pop-up learning media is less flexible because the message presentation is in the form of only visual elements. In this regard, various forms of learning media are motivated by researchers to create ICT-based learning media called I am Smart. PPKn, PJOK, and SBdP. Therefore, the purpose of this research was to develop "I Am Smart" media and see its effectiveness in increasing the learning motivation of students with

autism spectrum disorders.

METHOD

This type of this research was a research and development. The development model used was RnD (Research and Development) by Sugiyono. There are ten stages in R&D research, according to Sugiyono (2019). However, this research simplified it into six stages adjusted to the needs of the preparation and development of learning media. The results of the development of this study used the RnD (Research and Development) research and development method as a research method in which certain products were produced and tested for effectiveness. According to Sugiyono (2019), The development was carried out through several steps as follows:

The potential problems in this study were that there were students with autism spectrum disorders (ABK) at SD 01 Muhammadiyah Tanjung Enim, named Shopiah Zulfa, in class III even semester. Sophia was an autistic crew member. The calistung learning method was considered imperfect for students with autism spectrum disorders, so the researchers decided to develop the reading, writing, and counting learning method into audio and visual form through an Android-based application called "I am Smart."

The development of this application itself aimed to increase the learning motivation of students with autism spectrum disorders so that they could be more relaxed while learning because the media used varies and makes learning more enjoyable.

The data and data sources of this research were obtained through several observations and interviews with informants, namely the principal and homeroom teacher of SD 01 Muhammadiyah Tanjung Enim respondents, filling out questionnaires, and conducting tests in the form of product trials. While the data sources were obtained through media experts, material experts, homeroom teachers, and the students concerned,

The product design was done by creating interactive Android-based audio and visual media with all the subjects of even semester III grade, namely Mathematics, Indonesian, SBdP, PPKn, and PJOK. The product was made by presenting visuals in the form of images with the addition of audio so that respondents could learn and play. However, gaining an understanding of the material was conveyed through "I am Smart" Media. A number of experts—including media experts, field test experts, and material experts—validated the designed products. The validation itself was carried out to assess whether the resulting product was suitable as a learning medium or not. In addition,

the validator could also assess whether the "I am Smart" media was worthy of being used as material for consideration in motivating respondents when studying.

After the validation by the experts was carried out, the next step was to revise the product design. The product design revision itself was carried out by conducting interviews with media experts, field test experts, and material experts regarding whether there were any deficiencies that had to be added to the "I am Smart" media.

After the product design revision was completed, the final step was to try out the resulting product. The "I am Smart" media was tested on respondents. Respondents were taught using the "I am Smart" media. Before being taught, the respondents were given a product trial test. Then, the respondents were again given a final test, namely a trial, to find out whether they understood the material provided using this "I am Smart" media.

This research was conducted at SD 01 Muhammadiyah Tanjung Enim. The population of this study was students with autism spectrum disorders (autism) in class III at SD Muhammadiyah 01 Tanjung Enim, with a total of 20 students. The research sample was one using the non-probability sampling method. Data collection techniques using questionnaires, observation, tests, and interviews Questionnaires were developed into the quantitative data needed in research. The questionnaire used was a structured questionnaire with a Likert scale (very good (SB), good (B), sufficient (C), poor (K), and very poor (SK). The questionnaire was used to validate the developed media. The assessment of this questionnaire was carried out by one media expert, one linguist, and one field test expert. The validation assessment was to determine the feasibility of the developed media. In this study, observations were made 11 times on students with autistic disorders, while tests were used to assess whether students had understood the material provided before and after being given the I Am Smart learning media application, and interviews were conducted to find out about teacher and student suggestions, comments, and responses of the subjects after using the "I am Smart" learning media.

Primary data was those formed in words or verbally, usually said orally, about the behavior or movements of subjects that can be trusted, in this case, informants related to variables (Sugiyono, 2019). Primary data in this study were obtained from questionnaires, tests, and interviews with informants in their fields so they could convey relevant information. The sources of this data were students, class teachers, media experts, and subject matter experts for students with autism spectrum disorders in grade III. Secondary data were obtained from photo documents, video recordings, films,

graphics (SMS, meeting minutes, tables, notes, etc.), and other objects that could reproduce data (Sugiyono, 2019). Secondary data in this study were books, journals, and mass media about learning media, as well as other documents that are relevant to the Development of Smart Media in Helping to Increase the Learning Motivation of Autism Students at SD 01 Muhammadiyah Tanjung Enim.

The research data source was the subject from which the data was obtained. Data sources could be obtained from places, objects, people, motion, and others. The decision to determine and choose the type of data source was expected to affect how much or how little data could be obtained. Researchers obtained data sources from media experts, learning experts for students with autism spectrum disorders, students, principals, and class III teachers at SD 01 Muhammadiyah Tanjung Enim.

The data analysis techniques used in this development research consisted of three techniques: analysis of learning content, descriptive analysis, and analysis of test results.

Research Hypothesis

Hk: "I Am Smart" media can help students with autism spectrum disorders at SD 01 Muhammadiyah Tanjung Enim in increasing learning motivation.

Ho: "I Am Smart" media cannot help students with autism spectrum disorders at SD 01 Muhammadiyah Tanjung Enim in increasing learning motivation.

FINDINGS AND DISCUSSION

Findings

Based on the data obtained from this study, a person with special needs (ABK) was found at SD 01 Muhammadiyah Tanjung Enim. The reading, writing, and counting method was considered imperfect for students with autism spectrum disorders. It was usually carried out by the official teacher in the class, even though there were students in class III with special needs. Consequently, it made students with autism spectrum disorders experience difficulties, so they needed the help of learning media that suited their needs. Therefore, the researchers were moved to develop the reading, writing, and counting method into audio and visual form through an Android-based application with application called "I Am Smart" media.

The development of this research employed the RnD (Research and Development) approach in which certain products are produced and tested the effectiveness of the products that have been produced. The development is carried out through several steps as follows (Sugiyono, 2019).

1. Potential and Problems

Students with autism spectrum disorders at SD 01 Muhammadiyah Tanjung Enim were the object of this study's potential and difficulties. The reading, writing, and counting learning method was deemed inadequate for students with autism spectrum disorders, so the researchers decided to convert the method into audio and visual form using an Android application called "I Am Smart."

The development of this application aimed to increase the learning motivation of students with autism spectrum disorders, allowing them to be more at ease during the learning process because it made learning more pleasurable.

2. Data Collection

Several observations and interviews with informants were employed with the principal and homeroom teacher of SD 01 Muhammadiyah Tanjung Enim respondents. The completion of a questionnaire and experiments provided the data and the sources for this study. At the same time, the data source was obtained from the homeroom teacher and the students in question. The observations and interviews indicated that the reading, writing, and counting learning method was the only one used to instruct students with autism spectrum disorders at the school. The students with autism spectrum disorders in the classroom without an accompanied teacher studied in the teacher's office when not being in class. However, they did not study but only look over books.

3. Designing product

The design of the product is accomplished by creating interactive auditory and visual media on an Android platform for all the subjects of the third grade even semester, namely Mathematics, Indonesian, SBdP, PPKn, and PJOK. The product is created by combining visuals in the form of images with audio so that respondents can learn and engage while gaining an understanding of the information conveyed through "I Am Smart" media.

Figure 1. Design Display of "I am Smart" Learning Media Application

Figure 1 contains basic competencies with the aim that the teachers can be guided by existing aspects so the lessons given are conveyed to students.

Figure 2. Mathematics Lesson Slides

Figure 2 shows mathematics lesson slides as teaching materials for numbers, shapes, music (singing), and counting. The users (teacher and students) can choose whatever they want to learn in this math lesson.

Figure 3. Example of Mathematics Lesson

Figure 3 is an example of a mathematics lesson in the section on getting to know geometric shapes accompanied by pictures and audio.

Figure 4. Indonesian Language Lesson Slide

Figure 4 shows Indonesian language lesson slides as teaching materials for recognizing letters, learning to read, music (singing) and games.

Figure 5. PPKn Lesson Slides

Figure 5 shows PPKn lesson slides as teaching materials for commendable behavior, Pancasila, the names of religions, music (singing), games.

Figure 6. SBdP Lesson Slide

Figure 6 shows SBdP lesson slides as teaching materials for colors, learning skills, music (singing), games.

Figure 7. Example of an SBdP Lesson Slide

Figure 7 is an example of an SBdP lesson, namely learning to color. This game is made so that students can practice creativity by coloring an object.

Figure 8. PJOK Lesson Slide

Figure 8 shows PJOK lesson slides as teaching materials for getting to know sports games, getting to know the basic movements of music (singing), games.

4. Product Validation

Then, a number of experts—including media experts, field test experts, and material experts—validated the designed products. The validation itself was carried out to assess whether the resulting product was suitable as a learning medium or not. In addition, the validators could also assess whether the "I am Smart" media is worthy of being used as material for consideration in motivating respondents when studying. The results of the validator's assessment are presented as follows:

1. The Validation of media experts

Table 1. The Validation of Media Experts

No.	Evaluated Aspects	Indicator	Percentage	Evaluation Validity Level	Information
1.	Teaching materials	The "I Am Smart" media teaching material design	80%	Valid	No Revision
		The teaching material contents	100%	Very valid	No Revision
		The media's role in the learning process.	100%	Very valid	No Revision
		Language	80%	Valid	No Revision
		The physical quality of the media	100%	Very valid	No Revision
		Exercises	80%	Valid	No Revision

Information:

$P = \frac{\sum x}{\sum xi}$ x 100%

$P = \frac{540}{600}$ x 100%

P = 90%

Based on these calculations, the observation made by media experts reaches a value of 90% based on the feasibility level percentage table. This value is included in the very valid criteria.

Based on the results of media expert validation by Mr. Zainal Abidin, M.Pd., the validation level obtained is 90% based on Table 1. It means that the validity level is very valid. It shows that the used media was effective in increasing learning motivation for students with autism spectrum disorders so that it encourages students to more easily understand the material conveyed through the "I am Smart" media.

2. Material Expert Validation Results

Table 2. Material Expert Validation Results

No.	Evaluated Aspects	Indicator	Evaluation		
			Percentage	Validity Level	Information
1.	Teaching materials	Learning objectives	80%	Valid	No Revision
		Presented teaching material clarity	80%	Valid	No Revision
		Evaluation	80%	Valid	No Revision
		Feedback	80%	Valid	No Revision
		Exercises	80%	Valid	No Revision
		Language	80%	Valid	No Revision

Information:

$P = \frac{\sum x}{\sum xi}$ x 100%

$P = \frac{4}{5} \, x \, 100\%$

P = 80%

Based on these calculations, the observation made by teaching media experts reaches a value of 80% based on the feasibility level percentage table. This value is included in the valid criteria.

Based on the results of teaching material expert validation by Mr. Usup Sobirin, S.Pd., the validation level obtained is 80% based on Table 2. It means that the validity level is very valid. It shows that the presented teaching material in the "I am Smart" learning media is in accordance with the basic competencies of the students with autism spectrum disorders (or the students with autism spectrum disorders) and according to the needs of the research subjects. Material that is in accordance with basic competencies also makes it easier for the students or the subjects to understand the material.

3. Field Test Expert Validation Results

Table 3. Field Test Expert Validation Results

No.	Evaluated Aspects	Indicator	Evaluation		
			Percentage	Validation Level	Information
1.	Teaching material	Usage convenience of the "I am Smart" media.	100%	Very valid	No Revision
		The attractiveness of the "I am Smart" media.	80%	Valid	No Revision
		Media role of the "I am Smart" media.	80%	Valid	No Revision

Information:

$P = \frac{\sum x}{\sum xi}$ x 100%

$P = \frac{260}{300}$ x 100%

P = 87%

Based on these calculations, the observation made by teaching media experts reaches a value of 87% based on the feasibility level percentage table. This value is included in the very valid criteria.

Based on the results of the field test expert validation by Ms. Salmia, S.Pd., as the homeroom teacher of SD 01 Muhammadiyah Tanjung Enim, a validation rate of 87% is obtained based on Table 3. It means that the level of validity is very valid. It shows that the "I am Smart" media during field trials shows its effectiveness in increasing the learning motivation of students with autism spectrum disorders accompanied by students who understood the descriptions presented in the "I am Smart" learning media.

5. Product Design Revision

After the validation from the experts is carried out, the next step is to revise the product design. The product design revision itself is carried out by conducting interviews with media experts, field test experts, and material experts regarding whether there are deficiencies to be added to the "I am Smart" media.

After conducting validation tests by media experts, materials, and field tests on the "I am Smart" learning media or products. The validation value is at a vulnerable 80% -90%. It means that the "I am Smart" learning media is feasible or valid as development in motivating interest in learning for students with special needs.

The criticisms and suggestions given by media experts, material experts, and field test experts have been corrected, and the "I am Smart" learning application has been formed and presented in the best possible condition. Media experts provide suggestions for adding responses or feedback to application users when answering questions that are wrong or right. The researchers have added the feedback as explained in the following figure:

Figure 9. Feedback on The "I am Smart" Learning Media

The material experts provide suggestions in the form of repeating questions in the "I am Smart" application. The researchers have also added unlimited repetition for application users so that users can freely repeat questions that they do not understand. Finally, the field test experts provide suggestions for using a more colorful theme in presenting the application. At this stage, the researchers have also added colors considered quite interesting in presenting the application. Therefore, the application users are interested in using the "I am Smart" learning media application to understand the teaching material that must be mastered by the subject.

6. Trials

After the product design revision has been completed, the final stage is to try out the resulting product. The "I am Smart" media was tested on the respondents. The respondents were taught using the "I am Smart" media. Before being taught with the "I am Smart" media, the respondents were given a product test. Then after being taught to use the "I am Smart" media, the respondents were again given a final test, namely a product test, to find out whether the respondent understood the material provided using this "I am Smart" media.

The product trials were carried out using a test consisting of 20 questions. The test questions were prepared according to basic competencies. The product trial was divided into two. The researchers had not introduced the "I am Smart" learning media application for measuring the ability of students with autism spectrum disorders before being given an understanding through the "I am Smart" media. The researchers proposed subjects or students with autism spectrum disorders adapt slowly so they would not feel pressured to go through this learning process.

In the first trial to the third trial, the researchers had not introduced the "I am Smart" learning media for measuring the abilities of students with autism spectrum disorders before being given an understanding through the "I am Smart" media. The researchers proposed subjects or students with

autism spectrum disorders adapt slowly so they do not feel pressured to go through this learning process. The frequency of student or subject errors in answering errors was still quite high, namely as many as 14 wrong questions, so the ability to understand students with autism spectrum disorders was still considered low. The following is the result of scoring the value of the product trial before the introduction of I am Smart learning media in research:

Table 4. Scoring Question

Product Trials		
Trial 1	Trial 2	Trial 3
30	30	30

Evaluating the results of the acquisition of the subject's score during the product trial before being given the "I am Smart" learning media shows that the subject still has difficulty understanding the material before the "I am Smart" media.

In the 4th trial, the subject was introduced to the "I am Smart" learning media. The researchers expect that the subject could slowly adapt to the new learning media given. In the 4th trial, the frequency of errors was ten wrong questions. In the 5th trial, the subject showed the same error frequency as the previous observation, namely the number of 10 wrong questions. After passing several product trials with the "I am Smart" learning media in the 7th and 8th trials, there was a decrease in the frequency, and the subject made the number 6 error on the wrong questions. In the 9th trial, the subject experienced an increase in the frequency of errors, unlike previous observations. In this observation, the subject made an error frequency of 9 wrong questions. In the 10th trial, there was a decrease in the frequency of errors, namely seven wrong questions. On the last day of the 11th trial, the subjects began to adapt to the learning media so that the frequency of question errors began to decrease, namely the number of wrong questions, thus motivating students to study. Following are the results of scoring after being introduced to the "I am Smart" learning media in research:

Table 5. Scoring Problem

Product Trials							
Trial 4	Trial 5	Trial 6	Trial 7	Trial 8	Trial 9	Trial 10	Trial 11
50	50	60	70	70	55	65	75

Based on Table 7 and Table 8, the ability of students with autism spectrum disorders or subjects to answer the questions correctly increased significantly in the initial and final trials. With the results of product trials, the learning media can be said to be effective, evidenced by a decrease in the

frequency of error rates in answering questions and an increase in answering questions correctly. It can be said that "I am Smart" learning media can effectively encourage or motivate students with autism spectrum disorders in learning activities. Therefore, the "I am Smart" learning media can be used by teachers in providing learning materials, especially the students with autism spectrum disorders (autism) class III.

Discussion

Purwono et al. (2014) stated that the function of learning media is crucial in the process of knowledge transformation, as these learning media are crucial for motivating students, providing experience, and making it simpler for students to comprehend the presented material. The sole objective of the use of media in learning is to support teachers in education and enhance the learning experience in a more concrete manner (Kamid & Ramalisa, 2019). The struggle is to make learning more real by using the right learning media. Thus, to create learning media that can help motivate students, researchers develop media by utilizing advances in IT-based technology. Nurchaili (2010) also stated that IT is expected to make education more efficient and effective and to improve the quality of educational outcomes. IT, as an educational medium, is also able to provide students with many and varied experiences. IT is very useful for arousing student motivation in learning because this media provides many interesting experiences, especially experiences for the world outside of school (Khairiyah & Sanusi, 2022). Educational media I am Smart is an Android-based learning media application that can be downloaded and installed on a device. The development of I am Smart learning media products is anticipated to make it simpler for ABK students to study whenever and wherever they choose. It is consistent with research by Isniawati & Sujarwanto (2020) which stated that The rate of technological advancement is accelerating; for instance, many people own mobile phones or cell phones because they are simple and convenient to carry anywhere. Researchers have created I am Smart learning media products based on Android that can be accessed at any time, whether face-to-face or online, by utilizing technological advances.

Purwono et al., 2014 stated that learning media play a crucial role in enhancing the content of the teaching and learning process, making lessons more engaging and enjoyable. Purwono et al. (2014) also stated that teachers must get closer to adapting to current technological developments, especially the use of audio-visual media. To corroborate this opinion, research by Isniawati & Sujarwanto (2020), students with autism spectrum disorders can more easily understand objects using audio and visual media.

The "I am Smart" application media developed by researchers contains 5 (five) subjects, namely Mathematics, Indonesian Language, PPKn, SBdP, and PJOK, which are intended for elementary school Students with autism spectrum disorders. The subject matter contained in the "I am Smart" application media in Mathematics is knowing numbers, knowing geometric shapes, and counting. The Indonesian language subject contains subject matter to recognize letters and learn to read. PPKn subjects contain subject matter to recognize commendable behavior, to know Pancasila, and to know the names of religions. SBdP subjects contain material about colors and learning skills. PJOK subjects contain material on getting to know sports games and getting to know basic movements. According to Nirma et al. (2021), Learning that is appropriate for students with autism spectrum disorders, namely structured learning and structured learning strategies for students with autism spectrum disorders, are the provision of subject matter beginning with the simplest learning material that can be accomplished by students. Students with autism benefit from structured learning and can learn independently. Consequently, I am Smart learning media are developed using a structured learning strategy that includes images and audio to complete the learning material section. Through structured learning utilizing visual communication media, students with autism spectrum disorders are able to comprehend visual instructions.

In addition to the subject matter, this media is also equipped with supporting features, namely music. The music contained in the I am Smart learning media is adapted to the subjects for the mathematics subject "Learning to Recognize numbers," the Indonesian Language subject "Learning to Recognize the ABC Letters," the Civics subject "Wake Up My Sleep and Take a Bath," the SBdP subject "Learning to Recognize Colors, PJOK subject matter "Head Shoulders Knees Feet." Music can help students reduce boredom during the teaching and learning process. This is in line with research (Milyartini, 2010), which explains that music is very useful for students with autism spectrum disorders, which at first music can function usefully to increase the multiple intelligences of students with autism spectrum disorders. Second, the process of utilizing music can be tried through listening activities, activities of producing/playing music, and creating music that is integrated with movement. Third, each limitation (mental, physical, or social) requires a specific strategy for using music. Fourth, music activities allow students with autism spectrum disorders to gain self-confidence, self-esteem, and motivation to live a better life.

The development of the I am Smart application media is equipped with a game feature. The games contained in this application are also made differently for each subject. In the Indonesian language lesson, the game played is composing words, the game Civics subject played is a puzzle, the game SBDP subject is drawing, and the game PJOK subject is a puzzle. This game is made to train students' creativity.

According to Tejaningrum (2014), the aspect of play as a facility in education whose activities are tested with Educational Game Equipment (APE), which creates descriptions for students, shares fun, and develstudents'nt's imagination and intelligence abilities. So it can be concluded that the game is fun and enjoyable. And in fact, playing can be used as therapy for people with autism. Play therapy for people with autism aims to manage violent behavior, develop dialogue and social skills, and raise awareness of the presence of other people in the environment near them.

The I am Smart learning media application can work effectively so that it motivates students to learn in line with the research conducted by Fardani & Sayatman (2020), learning media based on Android applications that suit the learning needs of students with autism spectrum disorders, starting from the curriculum to how to learn, focusing on students with autism spectrum disorders is more controllable and not easily distracted. With the application of results based on this design, it is hoped that the effectiveness of the cognitive learning process for students with autism spectrum disorders can increase.

Seeing the learning outcomes that have occurred, we can all know that the application of I am Smart learning has an impact on achieving student learning, as evidenced by a decrease in the frequency of error rates in answering questions and an increase in answering questions correctly. Based on the results of scoring scores after being introduced to them, I am Smart learning media, it is known that the student's score is 75 in the good category. This shows that the application of I am Smart learning has an impact on student learning outcomes. In accordance with the findings of research conducted by Ramadania et al. (2020), The study's findings indicate that the use of media-based learning methods, specifically audio-visual media, has a significant impact on the learning outcomes of Indonesian language education for students with autism-related special needs.

The development of I am Smart media is able to provide encouragement or motivation to learn for students with autism spectrum disorders because researchers design learning applications according to the needs and abilities of students with autism spectrum disorders. In line with the results of research conducted by Abidin et al. (2014), The application of Android-based interactive

mathematics learning to students with autism spectrum disorders encourages or motivates students with autism spectrum disorders to learn. During the learning process, it is evident that students pose more questions, are more confident in expressing their opinions, and do not give up readily when confronted with more challenging questions and problems. In addition, students find learning simpler to comprehend because they no longer struggle with reading and seeing letters and numerals.

According to Damarratih et al. (2019), using the Math Pop Up Comic Book media with students with autism spectrum disorders, research demonstrates that students with autism spectrum disorders have no difficulty learning geometry. Students with autism have demonstrated proficiency and aptitude in the field of geometry, particularly with plane and geometric shapes. The more creative the learning media used by teachers in the learning process for students with autism spectrum disorders, the greater the impact on students with autism spectrum disorders' learning motivation, and the easier it is for students with autism spectrum disorders to comprehend the material being taught, according to previously explained research findings.

The development of the "I am Smart" application media is also equipped with a voice that explains the learning material. Rahmawati1 & Najib (2022) stated that voice seeks to introduce an enjoyable learning environment with educators despite the online nature of education so that students are always enthusiastic. It is anticipated that the development of I am Smart learning media will aid teachers in inclusive education schools so that, when instructing students with autism spectrum disorders (ABK), they can easily convey learning material so that ABK are not left behind and are able to adapt lessons like other students. It is anticipated that the development of I am Smart media will also aid in reducing difficulties, such as the need to consistently provide content using the Calistung method. Additionally, it is anticipated that the existence of I am Smart learning media will enable these issues to be resolved.

CONCLUSION

Based on the research conducted and the discussion of the research results, it can be concluded that Sugiono's six-step process for developing learning media can produce an Android-based learning media dubbed I am Smart. Based on the validation results, it can be concluded that the I am Smart learning media application is valid because the validation eligibility percentage is already between 80 and 90 percent, allowing researchers to use the I am Smart media application to

conduct observations at the destination school.

On the basis of observations made by researchers regarding the viability of I am Smart learning media and the results of product trials conducted during the research, it can be concluded that the application of I am Smart learning media can effectively motivate students to learn. As a result of working on the product trial test questions, the error rate decreased in response to fewer questions and increased in response to an increasing number of questions.

Researchers design learning applications according to the requirements and abilities of students with autism spectrum disorders, so the development of I am Smart media is thought to be able to encourage or motivate students with autism spectrum disorders to learn. Observations revealed that students were enthusiastic about learning, not dull, and motivated to acquire new information.

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