

Development of Steam-Based Interactive Poster Learning Media to Improve Higher-Level Thinking Skills for Kindergarten B Medan Tembung students

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Abstract. This study aims to produce a valid, practical and effective STEAM-based interactive poster media used to improve the higher-order thinking skills of kindergarten students. The implementation of this research was carried out in the odd semester of the 2022/2023 academic year. The module trial was conducted at TK B Al-Insani Medan Tembung. The subjects in this study were three expert validators (design experts, media experts, and materials experts), then teachers and children of group B AL-Insani Kindergarten Medan Tembung. Meanwhile, the object of this research is the development of STEAM-based interactive poster media to improve the high-order thinking skills of kindergarten students (level of feasibility, practicality and effectiveness of learning media).

Keywords: Media Poster, STEAM Learning, Higher Order Thinking Skills

1. Introduction

The importance of early childhood education is to develop, improve, and maximize the potential possessed by children, so that learning in early childhood is learning that is full of curiosity about what is around and the child's environment. Early childhood is generally very enthusiastic in exploring knowledge about things related to the natural surroundings that exist in the child's environment related to children's literacy. However, most early childhood educators are sometimes not ready with complex questions related to science and technology that surround children. Agree with Sumartono (2018).

Which states that early childhood educators on average are not equipped with HOTS teaching skills which lead to (1) remembering (2) understanding (3) doing (4) analyzing (5) evaluating (6) making. If so, when children ask complex and unanswered questions and are well constructed by answers guided by educators, in the future the children's enthusiasm for exploring and gaining their own knowledge will become shallower and fade.

From previous research conducted, it also provides results from interviews with several teachers in kindergarten who have been teaching for 5 years and already have educational certificates.

The teachers at the school said they understood 21st century learning and had applied it although there were still obstacles in its implementation.

The success or failure of the implementation of 21st century learning is seen from whether the child is able to have abilities such as the child being able to remember the lessons that have been given by the teacher, how the child understands the learning or material that has been delivered by the teacher, seeing the child doing the learning activities given by the teacher, seeing children's development in analyzing, seeing children's development in making or doing things well. ¹

So to improve the ability to think high-level children, teachers must be creative in carrying out learning activities such as children being more active in the learning process, such as carrying out learning with the help of varied and creative media and children are given time to ask questions to the teacher during the learning process. direct learning.

Learning media is anything that can be used to convey messages or information in the teaching and learning process so that it can stimulate children's attention and interest in learning.

One of the important things in learning activities is learning media where learning materials or materials have been arranged systematically based on certain principles and criteria. Learning media really needs to be owned by a teacher so that learning is carried out in accordance with predetermined goals².

Based on the researchers I did at Al-Insani Kindergarten Medan Tembung using the learning media Books from the government which are useful for the continuity of learning in the kindergarten, the advantages that exist are that the children continue to do the learning contained in the book such as the pictures and numbers shown. they will be studied in government books.

While the shortcomings in kindergarten are the lack of children's motivation to learn because the media is too monotonous so that children get bored easily. The use of media can strengthen understanding, especially ³ abstract processes that are difficult to imagine in his mind (Purnamasari,, 2020).

[1] ¹ Sumartono, H.A (2018). Use of posters as Health Communication Media. Communication Journal. Jakarta. 15(1).

[2] ² Sumartono, H.A (2018). Use of posters as Health Communication Media. Communication Journal. Jakarta. 15(1).

[3] ³ Maiyena, Sri. (2013). Development of Character Education-Based Poster Media for Global Warming Materials. Journal of Materials and Learning Physics (JMPF).3(1) 2089-6158

This means that students, especially at the young learner stage, will feel fun and a fun way of learning when they can see the animation through the process, they may be able to learn it more easily than just hearing the teacher's explanation.

Based on the conditions and problems above, it is necessary to solve the problem, one of which is by developing poster media.

Poster media itself has several advantages, the advantages of poster media compared to image media include poster media not only in the form of images but equipped with writing, color images and of course interesting and easy to understand by children.

Poster media itself has been developed by previous researchers including research by Maiyena (2014) on the development of Character Education-Based Poster Media for Global Warming Materials, showing that character education-based poster media has met the practicality criteria, which can be used and implemented in the learning process.

Especially children look for environmental stimuli that encourage their intellectual development such as object representation. Agreeing with Carney and Levin (2002) also stated that pictures not only enhance the reading-to-learn process, but they also indicate that these pictures must be well chosen or well-made.

The research I did at the Al-Insani Kindergarten in Medan Tembung only uses government books that have not maximized children's learning process, where there are many children who feel bored and children are not enthusiastic about learning at school.

Therefore, researchers provide input or suggestions for teachers to make learning poster media in order to increase the child's higher-order thinking.

After the researchers saw the situation and condition of the school, the researchers were interested in conducting research on the Development of Interactive Poster Media as HOTS Development of higher-order thinking skills for Kindergarten B children.

2.Theory

2.1 Definition of Learning and Learning

Learning is a process characterized by changes in a person. These changes can be shown in various forms such as knowledge, understanding, attitudes and behavior, skills, abilities, reaction power, receptiveness, and others (Sudjana, 2005: 28). According to Majid (2012: 135), learning is an interaction carried out between teachers and students in a teaching to realize the goals set. Trianto (2010: 16) states that the learning process occurs in many ways, both intentional and unintentional, and lasts all the time and leads to a change in the learner. The changes referred to here are changes in behavior in the form of additional knowledge, understanding, skills, attitudes, motivation and interests, and new habits acquired by individuals and other skills.

2.2 Higher Order Thinking Ability of Kindergarten B Al-Insani Students Definition of Higher Order Thinking Ability

High-level thinking according to someone to do something about facts, namely understand them, conclude them, relate them to other facts and concepts, categorize, manipulate, put facts together in new ways, and apply them in finding solutions to problems. (Thomas and Thorne in Heri et al, 2018)

In line with this opinion, Lewis & Smith (in Heri et al, 2018) state that higher order thinking occurs when a person obtains new information and stores it in memory to associate and rearrange, expand information to achieve goals and find answers in confusing conditions. From the opinions of the two experts, it can be concluded that higher order thinking skills require a more complex thought process in dealing with situations or solving[13]⁴.

3. Methods

Research and development is a process used to develop or validate products used in learning. The type of research used in this research is research and development. Research and development is a process or steps in order to develop a new product or improve an existing product (Amin and Mayasari, 2015)⁵.

This study aims to produce products with valid, effective and practical quality. The product developed in this study is a STEAM-based interactive poster learning media.

Sugiyono (2018:407) reveals research and development is a research method that produces certain products, and tests the effectiveness of these products in the field of education, the products produced through research and development are expected to increase educational productivity, namely graduates who are large in number, qualified, and relevant to needs.

Educational products such as certain educational needs, teaching methods, educational media, textbooks, modules, and others.

The data collection instrument in this development is in the form of an assessment instrument to assess the product that has been developed. The main instruments used to collect data in the development of this data are as follows:

1. Validation Questionnaire Sheet

Expert Team Validation questionnaire sheets were used to obtain assessment data from validators about the product being developed, namely STEAM-based poster media.

2. Practicality Sheet

[4] Purnamasari,I,Deawnati.S,Ali F. 2020. Stimulation of HOTS Skills in PAUD Through STEAM Learning. Postgraduate National Seminar.

[5] ⁵ Amin, A. K & Mayasari, N. (2015). Development of learning media in the form of a weblog-based android application to improve learning outcomes for mathematics education students at IKIP Bojonegoro. *Magistra Journal*, 27 (94).12

[6] Sugiyono. (2013). *Educational Research Methods – Quantitative, Qualitative and R&D Approaches*. Bandung: Alfabeta.

The teacher questionnaire sheet was used to obtain practicality assessment data from the teacher regarding the product being developed, namely the STEAM-based Poster media.

3. Effectiveness Test

The test of the effectiveness of the STEAM-based Poster media was carried out using the student activity sheet (LKPD) filled out by the child. The indicator of effectiveness is if 75% of the child's score exceeds the KKM score.

4 Results and Discussion

The importance of early childhood education is to develop, improve, and maximize the potential possessed by children, so that learning in early childhood is learning that is full of curiosity about what is around and the child's environment. Early childhood is generally very enthusiastic in exploring knowledge about things related to the natural surroundings that exist in the child's environment related to children's literacy. However, most early childhood educators are sometimes not ready with complex questions related to science and technology that surround children.

Agree with Yakman (2021) stating that early childhood educators on average are not equipped with HOTS teaching skills which lead to (1) remembering (2) understanding (3) doing (4) analyzing (5) evaluating (6) making. If so, when children ask complex and unanswered questions and are well constructed by answers guided by educators, in the future the children's enthusiasm for exploring and gaining their own knowledge will become shallower and fade. So to improve the ability to think high-level children, teachers must be creative in carrying out learning activities such as children being more active in the learning process, such as carrying out learning with the help of varied and creative media and children are given time to ask questions to the teacher during the learning process. direct learning. One of the interesting forms of learning is the STEAM model. In addition to implementing STEAM-based learning models, interesting learning media are also needed for children such as Poster learning media.⁶

Based on the above study, the development of STEAM-based poster learning media was carried out through the ADDIE development model which has five steps or stages which include aspects of Analyze (analysis), Design (design), Development (development), Implementation (application), and Evaluation (assessment). The results of the research and information gathering stages as well as the learning description analysis stage, tasks to be studied and objectives are presented as input at the design stage, where the descriptions and objectives are converted into specifics for learning.

[7] ⁶ Yakman .(2021). STEAM Based Learning Planning Early Childhood Education Learning In. Semarang City.

The results of the validation to determine the level of feasibility results on the developed product are assessed from the results of the assessment of material experts, media experts and design experts. Based on the assessment of the results of the material experts in Table 4.2, it can be seen that there are 14 items related to product evaluation with 3 aspects, the assessment of the relevance aspect has an assessment of 94.1%, the Consistency aspect has an 87.5% assessment, and the adequacy aspect is 100%. Then the data were analyzed by calculating the percentage score of learning media developed according to material experts, obtained calculations between $81.26\% < P 100\%$, which was 92.8% and stated that it was very valid.

Based on the results of the assessment of material experts who have been assessed as in Table 4.3 above, it can be seen that the statements related to product evaluation are 20 items with 3 aspects, the content aspect has an assessment of 98%, the presentation aspect has an 85% assessment, and the graphic aspect is 100%. Then the data were analyzed by calculating the percentage score of the learning media developed according to the material experts, obtained calculations from learning design experts between $81.26\% < P 100\%$, which was 91.11% and stated that it was very valid without any data being corrected.

Furthermore, based on the results of the assessment of media experts who have been assessed as in Table 4.4 above, it can be seen that the statements related to product evaluation are 9 items with 2 aspects obtained an assessment of aspects of media design principles by 62.5% and message design aspects by 74%. Then the data was analyzed by calculating the percentage score of learning media developed according to media experts, the calculation above was obtained, then the percentage range obtained was between $60\% < 80\%$, which was 69% and declared valid with the corrected data.⁷

The results of the assessments given by the Expert Team Validation of materials, designs and media, the overall product developed is declared to be very valid with little data corrected. The data obtained prove that the STEAM-based Poster media is declared feasible to be used as a learning medium as has been proven by previous researchers, although in this case there are differences compared to previous studies. The difference that exists in the current research conducted by researchers with previous research is the type of media used, namely Poster media.⁸

[8] ⁷ Reddi, Usha V. & Sanjaya Mishra. 2013. Educational Multimedia- A Handbook for Teacher-Developers. New Delhi: The Commonwealth of Learning Commonwealth Educational – Media Center for Asia.

[9] ⁸ Lanti, Elly. (2017). Media Development of Poster Media for Gorontalo PAUD School Students: Althra Samudra Publishing.

[10] Nana Sudjana. 2005. Fundamentals of Teaching and Learning Process. Algesindo New Light. Bandung

Furthermore, to determine the practicality of the developed product, it can be seen by the assessment obtained from the teacher response questionnaire distributed to 3 teachers at Al-Insani Kindergarten Medan Tembung. At this stage the STEAM learning media that has been developed is then implemented to the children of group B AL-INSANI Kindergarten Medan Tembung. Previously, the researcher demonstrated the learning media in front of the class before the children came forward to carry out learning activities with the STEAM-based Poster learning media. After that, students are welcome to use the learning media and try to do the evaluation contained in the learning media. The instrument used in this implementation phase is in the form of a response questionnaire.

Based on the results of the teacher's response assessment as in Table 4.5 above, it can be seen that the statements related to product assessment are 8 items with an assessment of a Very Good score of 3 items and a Good score of 5 items. To determine the achievement of learning objectives in terms of teacher responses, if the number of teacher assessments who gave positive responses was greater than or equal to 80% of the many subjects studied for each trial, and the results obtained were 83%, the media developed was declared feasible.

Furthermore, at the evaluation stage, the effectiveness of the developed learning media will be tested obtained from the results of student learning tests that are assessed through pre-test and post-test. The following is a recapitulation of pre-test and post-test scores of student learning outcomes. Based on these data, the final achievement of this study is only to increase learning outcomes with the achievement of student learning completeness criteria if in the class there are 85% who have achieved KB 65%.

The results of the acquisition of learning mastery are obtained by 100%, so the media developed can be declared effective to improve student learning outcomes, especially in modern and traditional communication tools. Furthermore, the analysis of pretest and posttest questions was used to determine the improvement of students' skills in higher order thinking after using STEAM-based interactive poster media. The analysis is done by calculating the gain score. The following are the results of the calculation of children's learning outcomes. The results of the gain score above are in the assessment criteria ($<g>$) 0.7, which is 0.8. This proves that the criteria for improving children's higher order thinking skills is high.

These results agree with the results of research conducted by Setiadi (2021:13) in his research entitled *Mobile Learning in Interactive Learning for Early Childhood Using the STEAM Method*. development of student creativity. In building mobile education in interactive learning for early childhood to present or introduce mobile-based education technology to children from an early age, in independent learning it is easily accessible outside class hours and assisting teachers in teaching in particular.

Likewise, the research conducted by Nana (2005:3) in his research entitled *Analysis of Art Elements in Steam Learning for Early Childhood*. So it can be concluded that the basic needs of

art element analysis in the development of STEAM learning in terms of analysis and exploration are very important and need to be developed considering the results of the learning activities are still not varied because the activities in the art element are only coloring and should be 3M (coloring, cutting, and pasting).

STEAM is a learning that encourages children to be creative in problem solving, think logically, and can think symbolically. STEAM (Science, Technology, Engineering Art and Mathematics) in the learning process is packaged by combining science, technology, engineering, mathematics and art. According to Agustina, et al (2020) it is hoped that in STEAM learning, it is hoped that the ability to adapt, think flexible and take initiative, want to develop themselves, be productive, can be trusted, have leadership and responsibility. Lanti, Elly (2017:1-7) in her research entitled Understanding AUD Geometry Concepts in STEAM-Based Learning proves that STEAM-based learning is able to develop an understanding of early childhood geometry concepts. The development of geometry in this study is more on the innovation of the learning model that is applied, namely STEAM-based learning which is able to make children more active in learning. Suggestions for further research, can conduct research on the development of understanding the concept of geometry in other aspects by improving the quality in terms of implementation or media that is able to achieve optimal results.

Based on the suggestions conveyed by Sa'ida above, the current research is to develop Poster media as a support in learning. Maiyena (2013) in her research entitled Development of Stimulation of Children's Speaking Ability through Poster Media concluded that the relevance of this research in developing poster media is very good and has met the practicality criteria, which can be used and implemented in the learning process.

Table 1. Validation results from the Material Expert Team

No	Aspect	Indicator	Evaluation	Maximum Score	Score/ Percentage	Total
1	Relevance	Learning Materials and Objectives	7	8	87,5%	94,1%
2		Learning Materials and Activities	10	12	83,33%	
3		Materials and methods	4	4	100%	

4		Materials and Evaluation	4	4	100%	
5		Time Allocation Accuracy	4	4	100%	
6	Consistency	Material and Discussion	3	4	75%	87,5%
7		Subjects and Sub-topics	4	4	100%	
8	Adequacy	Systematic	4	4	100%	
9		Child characteristics	8	8	100%	100%
10		Material with media	4	4	100%	
Average			0,928		92,8%	

Based on the results of the material expert's assessment that has been assessed as in Table 4.1 above, it can be seen that the statements related to product evaluation are 14 items with 3 aspects, the assessment on the aspect of relevance has an assessment of 94.1%, the aspect of Consistency has an assessment of 87.5%, and The adequacy aspect is 100%. Then the data was analyzed by calculating the percentage score of learning media developed according to material experts, obtained:

$$P = \frac{f}{N} \times 100\% = \frac{(10 \times 4) + (4 \times 3)}{(4 \times 14)} \times 100\% = \frac{52}{56} \times 100\% = 92,8\%$$

Based on the above calculation, the percentage range obtained is between $81.26\% < P < 100\%$, which is 92.8% and states that it is very valid. The following is a graphic image of the material expert's assessment:

[11] ⁹ Hake, R, R. (1999). Analyzing Change/Gain Scores. AREA-D American Education Research Association's Division. D, Measurement and Research Methodology

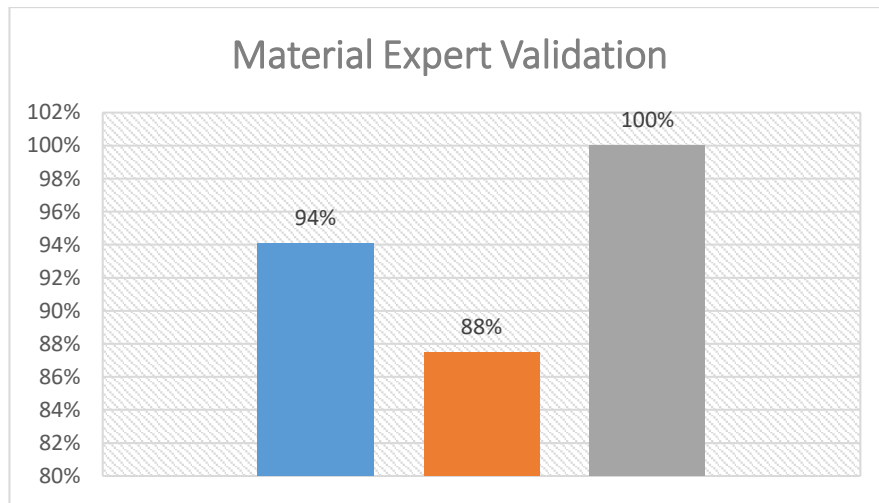


Figure 1. Material Expert Assessment Chart

a.2. Media Expert

The results of the assessment of the media expert validation team received by researchers when conducting trial activities to media experts are as follows:

Table 2. Media Expert Assessment Results

NO	Aspect	Indicator	Evaluation	Maximum Score	Score/ Percentage	Average
1	Media design principles	Simplicity	2	4	50%	62,5%
		Cohesiveness	3	4	75%	
		Balance	3	4	75%	
		Emphasis	2	4	50%	
2	Message Design	Message achievement	2	4	50%	75%
		Message depth (content)	4	4	100%	
		Message clarity (language used)	4	4	100%	
		Message complete	3	4	75%	
		Systematic / order of presentation	2	4	50%	
			25	36	69%	

Based on the results of the assessment of media experts who have been assessed as in Table 2 above, it can be seen that the statements related to product evaluation are 9 items with 2 aspects obtained an assessment of aspects of media design principles by 62.5% and message design aspects by 74%. Then the data were analyzed by calculating the percentage score of learning media developed according to media experts, obtained:

$$P = \frac{f}{N} \times 100\% = \frac{(2 \times 4) + (3 \times 3) + (4 \times 2)}{(4 \times 9)} \times 100\% = \frac{25}{36} \times 100\% = 69\%$$

Based on the above calculation, the percentage range obtained is between 60% x <80%, which is 69% and states that it is valid with the corrected data. The following is a graphic image of the media expert's assessment:

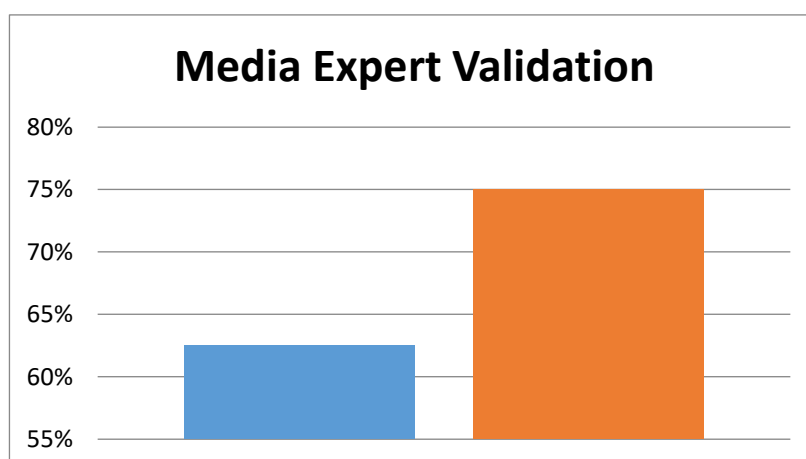


Figure 2. Media Expert Assessment Graph

Table 3. Results of Design Expert Assessment

No	Aspect	Indicator	Evaluation	Maximum Score	Score/ Percentage	
1	Content Eligibility	Topics	4	4	100%	98%
2		Learning objectives	4	4	100%	
3		Menu	4	4	100%	
4		Color Composition	4	4	100%	
5		Student Interest	3	4	75%	
6		No Elements of SARA	4	4	100%	
7		Child characteristics	4	4	100%	

8	Presentation	Giving Motivation	3	4	75%	85%
9		Clarity of material description	3	4	75%	
10		Explanation of the examples provided	3	4	75%	
11		Use of new Information	3	4	75%	
12		Feedback on student test results	3	4	75%	
13		Chromatic/sequential	4	4		
14		Maximizing the learning process	4	4	100%	
15		Use of study guide	4	4	100%	
16		Use of the term	3	4	75%	
17		Color composition	3	4	75%	
18	Graphics	Selection of font type and size	4	4	100%	100%
19		Language Comprehension	4	4	100%	
20		Ease of use	4	4	100%	

Based on the results of the material expert's assessment that has been assessed as in Table 3 above, it can be seen that the statements related to product evaluation are 20 items with 3 aspects. Then the data was analyzed by calculating the percentage score of learning media developed according to material experts, obtained:

$$P = \frac{f}{N} \times 100\% = \frac{(13 \times 4) + (7 \times 3)}{(4 \times 20)} \times 100\% = \frac{73}{80} \times 100\% = 91,25\%$$

Based on the calculation above, the percentage range obtained from learning design experts is between 81.26% < P 100%, which is 91.11% and states that it is very valid without any data being corrected. The following is a graphic image of the design expert's assessment:

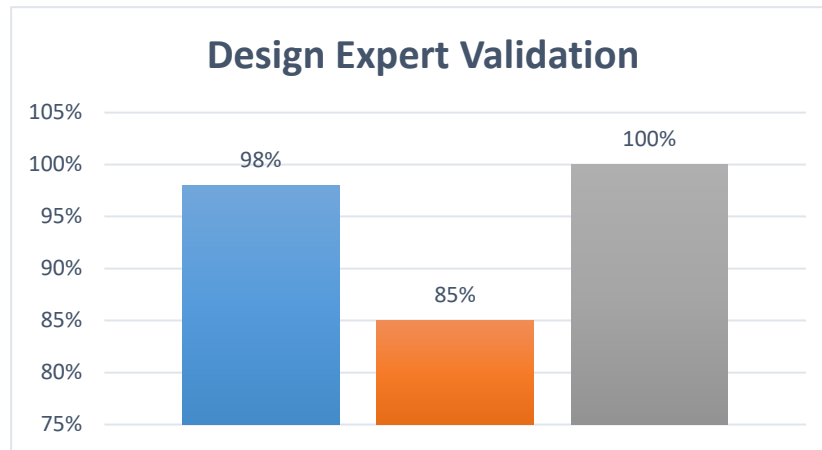


Figure 3. Design Expert Rating Chart

The results of the assessments given by the Expert Team Validation of materials, designs and media, the overall product developed is declared VERY VALID with a few data corrected. The next stage is the researcher conducts the corrected data according to the direction of the media expert.¹⁰

4 Conclusions

Based on the data from the research and discussion that have been described, the following conclusions can be drawn:

The results of the feasibility test based on the validity showed that the Material Validator Expert Team obtained a percentage of 92.80%, the learning design expert obtained a percentage of 91.25%, and the media expert obtained 69% so that the overall product developed was declared very valid and feasible with a little corrected data as Learning Media in Kindergarten B Al-Insani Medan Tembung.

The results of the practicality analysis based on the recapitulation assessment of teacher response questionnaires that have been carried out on 3 teachers, it is obtained that the teacher's assessment states that 83% of practical poster media are learning media in TK B Al-Insani Medan Tembung.

[12] ¹⁰ Kim, H., & Chae, D.H. (2016). The Development and Application of A STEAM Program Based on Traditional Korean Culture. Hasanah, Uswatun, Edy Nurfalih. (2020). Test the Validity of Macromedia Flash-Based Learning Media Development on Data Presentation Material. Proceedings of the National Seminar on Research and Community Service. 5(2). 384-387.

The results of the effectiveness analysis based on student learning completeness in the class have reached KB 65%, which is 100% with the gain score above being in the assessment criteria ($\langle g \rangle$) 0.7, which is 0.8. This proves that the criteria for improving children's higher-order thinking skills is high and STEAM-based Poster media is declared Effective as a learning medium to improve higher-order thinking skills of children in Kindergarten B Al-Insani Medan Tembung.

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