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RESEARCH ARTICLE

THE VALIDITY OF INTERACTIVE MULTIMEDIA INTEGRATED NATURAL SCIENCE BASED ON GUIDED INQUIRY WITH THEME ENERGY IN THE LIFE THAT INTEGRATE OF LEARNING FOR THE 21ST CENTURY

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Abstract

This study discusses the validity of the development of integrated science interactive multimedia with the theme of energy in life which is integrated with 21st century learning using a guided inquiry model for grade VII students in junior high schools (SMP). To get a valid interactive multimedia, an expert review was carried out by several people who are experts in their fields using an instrument in the form of a questionnaire sheet given to three experts. The results of the evaluation of the validity of the Integrated Science interactive multimedia show that the developed multimedia is in the valid category. This can prove that the development of integrated science interactive multimedia based on guided inquiry with the theme of energy in the integrated life of 21st century learning is valid for further development and can be used in the learning process.

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Introduction:-

The function and objective of national education is to develop the capability and to shape the dignified character of the nation's civilization in educating the nation's life in order to form an education with character in accordance with Indonesian culture, and in line with the demands of 21st Century skills with all its challenges [1]. 21st century education is education that integrates knowledge skills, skills, and attitudes, as well as mastery of ICT which refers to critical, creative, communicative and collaborative thinking [2]. These skills can be developed through various learning models that refer to the 2013 Curriculum, one of which is in the subject of Natural Sciences [3].

Through integrated science learning, students will later be able to gain direct experience, so that they can increase the strength to receive, store, and apply the concepts they have learned [3]. This requires educators to be able to adjust learning activities in the classroom by using a learning model that is in accordance with the demands of the government accompanied by using integrated learning media of 21st century learning to attract student learning interest and help students have a critical mindset in facing the challenges of 21st Century learning, so that can improve competence, both attitude competence, knowledge, and skills and can help students in studying themselves and their surroundings [4].

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Learning media is one of the supports in helping the learning process occur. A good interactive learning media is a medium that creates interactivity that allows students to respond to the material presented [5] [6]. This 21st century integrated learning media can increase students' motivation to learn, so that students feel that science lessons are very close to their lives, such as plants, animals, the environment and themselves. This of course will have a good impact on the development of knowledge competencies, social and spiritual attitudes, and skills of students if implemented using a suitable learning model, namely the guided inquiry model.

Guided inquiry model is an approach used in order to form science in the form of process skills, showing events, inductive and deductive learning, and learning to solve problems with the direction and guidance of a teacher [7]. Previously, the Integrated Science Teacher and Student Book has been developed which is integrated 21st century learning which has been tested for its validity [8] [9] [10] [11] [12] [13]. However, problems arise in its implementation, namely the absence of learning media in the form of interactive multimedia that supports the use of the book to prepare students to face the challenges of the 21st century, one of which is by integrating 21st century skill indicators into Science Interactive Multimedia which will be used through Guided Inquiry model, so that can overcome the limitations of space and time in the learning process. To get interactive multimedia that is integrated into 21st century learning in order to create more varied learning methods, it is necessary to develop valid multimedia that is reviewed by experts according to their respective fields. Therefore the title raised in this study is the Validity of Integrated Multimedia Interactive Science based on Guided Inquiry with the theme Energy in Life, Integrated 21st Century Learning.

Methods:-

The research was carried out using the Plomp research design development model which consisted of three stages, namely the preliminary research phase, the prototyping phase and the assessment phase [14].

A media is said to have quality in product development seen from the validity criteria [9]. Validity is an assessment of a product in terms of material and appearance. Sumarna (2005), states "Validity is a concept related to the extent to which the test has measured what should be measured". From the results of the validity test, the strengths and weaknesses of the product will be identified. The validity test is carried out by experts. The experts in question are people who are considered to understand the meaning and substance of giving multimedia or can also be professionals in their fields such as lecturers.

The validity component consists of components of content multiplication (including compliance with the curriculum), presentation (clarity of objectives / indicators to be achieved), language (good and correct suitability of Indonesian and effective use of language), and graphics (use of fonts and letters, layout, illustrations, images, and display designs) [15]. Validity indicators can be seen in Table 1.

Table 1:- Validity Indicators.

Indicator	Sub Indicator
Content eligibility	Suitability of material with KI and KD
	Conformity with learning objectives
	The truth of the material substance
	Benefits to increase knowledge
	Conformity with 21st century skills
Serving Feasibility	Clarity of goals to be achieved
	Give motivation
	Completeness of information
Design Language	Legibility
	Clarity of information
	the suitability of Indonesian is good and correct
	use of language effectively
Graphics	use of fonts and fonts
	Layout
	illustrations, drawings, and display designs

The product assessment based on a questionnaire will be filled in by experts / experts, then it will be analyzed to determine the extent of the validity of a product to be developed. The validity analysis uses Likert scale with the following steps:

- a. Give a score for each answer item, where the answer is very good by getting a score equal to 4, good answers will get a score equal to 3, good answers will get a score equal to 2 and bad answers will get a score equal to 1.
- b. Add up the total score of each validator for all indicators.

c. Giving validity values using the Aiken's V formula [16], namely:

$$V = \frac{\sum s}{[m - (c - 1)]}$$

Information :

$$s = r - l_o$$

l_o : The lowest validity score

r : The number given by the validator

c : The highest validity score

The validity category of data can be seen in Table 2:

Table 2:-Validity categories.

Interval (%)	Categories
0.0 – 0.60	Invalid
0.61 – 1.00	Valid

Based on Table 2 above, it can be seen that if the data is categorized as valid if the validity interval is in the interval ≥ 0.61 , while the data is said to be invalid if the validity interval is in the interval ≤ 0.60 [17].

Results and Discussion:-

Preliminary research conducted at SMPN 4 Pasaman consisted of SKL analysis, analysis of learning activities, analysis of learning media and analysis of students.

SKL analysis:

Graduate competency standards state that students must have competence in 3 domains, namely: attitudes, knowledge and skills. Analysis of the passing standards can be seen in Figure 1.

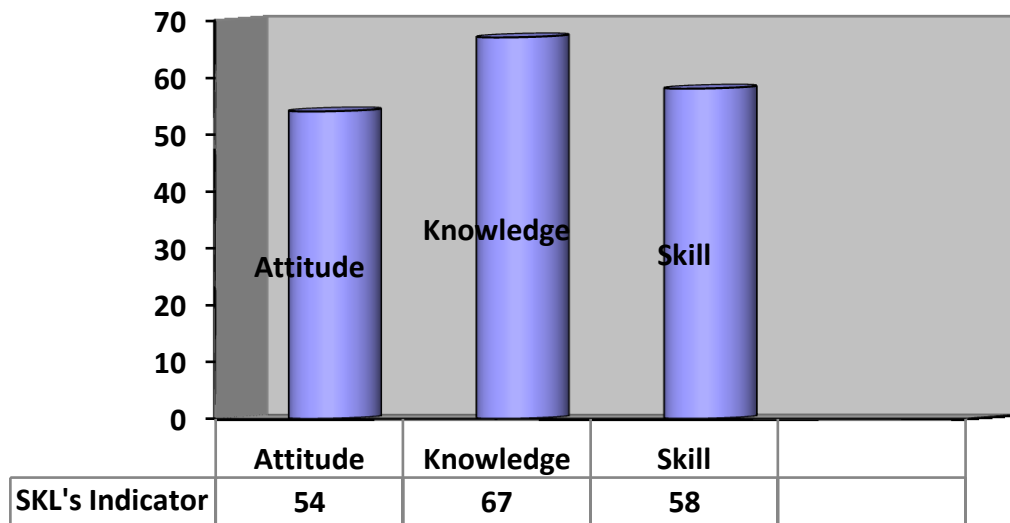


Figure 1:- Analysis of Graduate Competency Standards.

Figure 1 shows that the domains of attitudes, knowledge and skills have respective percentages of 54%, 67% and 58% who are in the poor category. This explains that the learning process has not been balanced in attaining competence in attitudes, knowledge and skills so that efforts are needed to improve it.

Analysis of Learning Activities:

Analysis of learning activities carried out, namely analysis of preliminary activities, core activities, and closing activities. The results of the analysis can be seen in Figure 2.

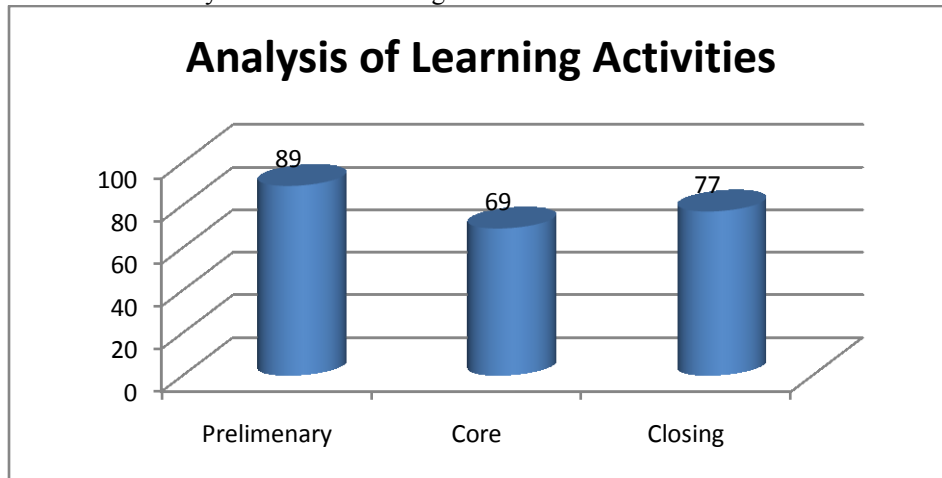


Figure 2:- Analysis of Learning Activities.

The results of the analysis in Figure 2 show that the aspects of preliminary activities, core activities, and closing activities are 89% in the good category, 69%, and 77% in the moderate category. This shows that educators have not implemented learning activities optimally.

Learning Media Analysis:-

Learning media is one of the learning tools that teachers must have as a tool in the learning process, so as to create a learning atmosphere that can attract the attention of students and foster learning motivation [18]. Analysis of the learning media used at SMPN 4 Pasaman can be seen in Figure 3.

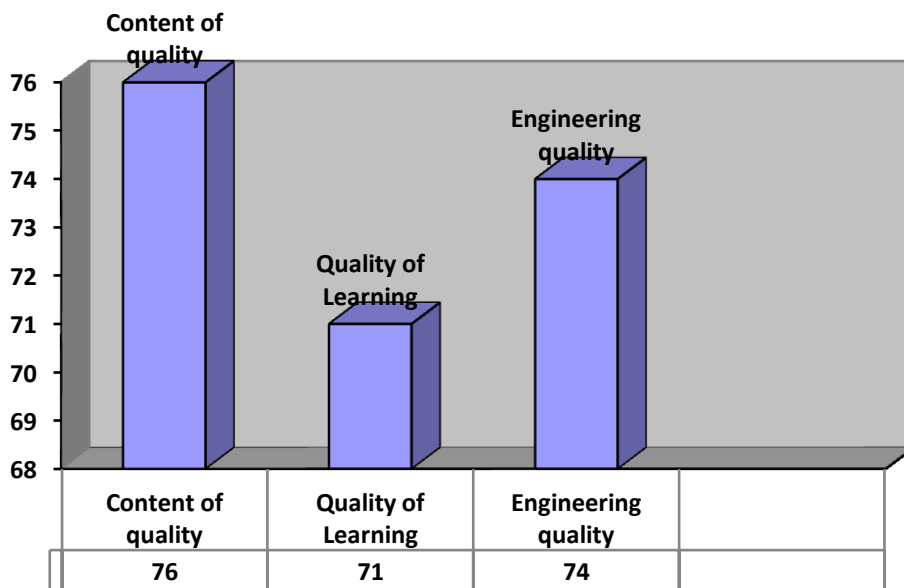


Figure 3:- Learning Media Analysis.

Figure 3. Illustrates that the use of instructional media in schools for indicators of content quality, learning quality and technical quality is in the sufficient category. This shows that the quality of the content and the quality of learning in the media used in school are still not optimal and do not match the criteria for good and correct media so that the achievement in facing global challenges is not reflected. Where the teacher is required to design and use learning media that can attract the attention of students and trigger students' critical thinking skills, and adapted to the diverse characteristics of students.

Student Analysis:

The characteristics and development of students are a condition that must be considered in preparing learning tools, both those related to the interests, talents, learning styles and basic abilities of these students. Students who have good basic abilities will be different from students who do not have basic abilities. Student Character Analysis can be seen in Figure 4.

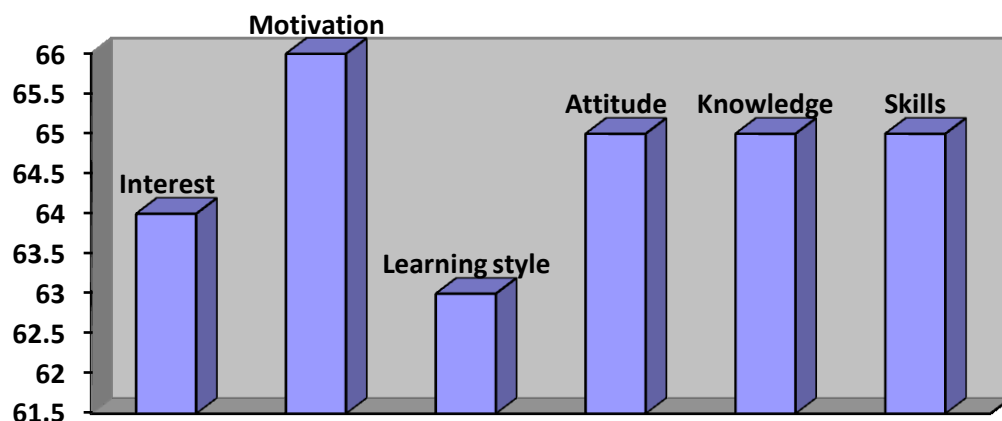


Figure 4:- Student Analysis.

Figure 4. Explains that the results of the analysis of students for all indicators are in the poor category. This is because Natural Science learning in schools is still general and not yet contextual, the use of media and teaching materials is also less specific on a theme that is close to the lives of students and is still separated between disciplines which has an impact on students' lack of interest in learning so that participants students do not understand learning well.

21st Century Skills Analysis:

Analysis of 21st Century skills was carried out to determine the level of early ability of students in critical thinking, creative thinking, communication and collaboration. The results of the 21st Century skills analysis of students at SMPN 4 Pasaman can be seen in Table 3.

Table 3:- Results of 21st Century Skills Analysis Class VII SMPN 4 Pasaman.

Class	Skills			
	Critical Thinking and Problem Solving	Creative and Innovation	Communication	Colaboration
VII.1	66%	67%	74%	79%
VII.2	57%	59%	61%	64%
VII.3	67%	67%	68%	71%
VII.4	66%	67%	67%	72%

Based on Table 3, it can be seen that the skills of the 21st century students are still low. The results of observations made at SMPN 4 Pasaman, in schools still use a learning process that is more focused on learning that asks students to understand the subject matter by listening to explanations from the teacher (teacher centered), and reading books or learning resources provided at school. so that students have not been seen and trained in mastering 21st century

skills, namely mastery of critical thinking and problem solving, creative and innovation skills, communication and collaboration skills to face the challenges of this era 4.0.

The next stage is the prototyping phase which consists of a design stage and an assessment stage (formative).

Design Stage:

Based on the preliminary research analysis, an integrated science interactive multimedia design based on guided inquiry was carried out with the theme of energy in the integrated life of 21st century learning. Interactive multimedia is designed based on defined interactive multimedia components [19] [20]. Interactive multimedia design based on story board design produces an interactive multimedia product called prototype 1. The next step is to develop prototype 1.

Assessment stage (formative):

The steps taken in formative evaluation are self evaluation, expert review to obtain multimedia validity, one-to-one evaluation, small group evaluation, and field. test (field test) to get practical interactive multimedia.

Self-Evaluation Assessment:

Self-evaluation was carried out by the author and two friends who also developed teaching materials. The results of the self-evaluation show that there are several parts of interactive multimedia that need to be improved including in the multimedia title section, student answer column, pictures and sentence writing. Then revisions are made based on the evaluation carried out and proceed to expert judgment.

Expert Validation:

The expert assessment was carried out by three experts. Before validating interactive multimedia, an assessment of the validation instrument and interactive multimedia practicality was carried out.

Assessment of validation instruments and practicality:

The assessment of validation instruments and practicality uses a validation sheet which includes indicators written in clear sentences, statements according to indicators, statements in accordance with the objectives to be achieved, does not have multiple meanings, has a simple and easy to understand scoring format, and is in accordance with Indonesian spelling rules good and right. The results of the validation instrument assessment and practicality of the three validators can be seen in Table 4.

Table 4:- Evaluation Results of Interactive Multimedia Validation Instruments.

No	Validator	Average	Criteria
1.	Validator 1	0.99	Valid
2.	Validator 2		
3.	Validator 3		

Table 5:- Results of Assessment of Teacher Response Practical Instruments.

No	Validator	Average	Criteria
1.	Validator 1	0.96	Valid
2.	Validator 2		
3.	Validator 3		

Table 6:- Results of Assessment of Student Response Practicality Instruments.

No	Validator	Average	Criteria
1.	Validator 1	0.96	Valid
2.	Validator 2		
3.	Validator 3		

Based on the three tables above, it can be seen that the instruments for product assessment and practicality assessment that will be distributed to teachers and students are valid for use.

Interactive multimedia validation assessment:

The evaluation of the validity of interactive multimedia was carried out using previously validated assessment instruments. After the instrument to be used is valid, an assessment or product validation is carried out to the experts which includes four components of the assessment, namely the content, construct, linguistic component, and graphic component. The results of the expert validation analysis can be seen in Table 7.

Table 7:- Results of Interactive Multimedia Validation Assessment by Experts.

Componen	Validation Value	Criteria
content validation	0.89	Valid
construct validation	0.89	Valid
linguistic validation	0.85	Valid
graphic validation	0.89	Valid
Average	0.88	Valid

Based on table 7, it can be seen that the Integrated IPA interactive multimedia product developed is valid in terms of content, construct, language and graphic feasibility. This suggests that the integrated IPA interactive multimedia products developed can be used and evaluated by small groups.

Conclusion:-

Based on the results of preliminary research analysis and expert reviews, it was found that interactive multimedia integrated science based on guided inquiry with the theme of energy in integrated life, 21st century learning is in the valid category and is very good developed to help teachers and educators improve the competence of students in the learning process to deal with global challenges.

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