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Practicality of Student Worksheet on Global Warming Generative Learning Model Based on Cognitive Conflict to Facilitate Students' Problem Solving Ability

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ABSTRACT

Physics learning requires supporting teaching materials, especially on the subject of global warming. This subject requires students' problem-solving ability. Preliminary studies show that students' problem-solving ability are still relatively low. One possible alternative to address this issue is to develop a global warming worksheet based on a generative learning model using cognitive conflict to facilitate students' problem-solving ability. The purpose of this study is to determine the validity and practicality of the global warming worksheet using a generative learning model based on cognitive conflict. This research is a development (R&D) that uses the ADDIE development model. The ADDIE development model is one of the systematic learning design models. The object of this study is a global warming worksheet using a generative model based on cognitive conflict. The measurement data used are validity and practicality. The data obtained were analyzed using descriptive statistical techniques. The validity test indicates that the worksheets were valid for use with a score of 0.91 by experts. The practicality test results showed that the worksheets were very practicable for use with a score of 99.22% by practitioners and 88.01% by users. The results of the study concluded that the developed worksheets were valid and very practicable for use in supporting physics learning.

Keywords: Student Worksheet, Generative, Conflict Cognitive, Problem Solving

I. INTRODUCTION

Physics education play a very important part in preparing the coming generations to face future challenges. Physics education relies on all efforts to prepare students for learning. Physics education must be tailored to the needs of students so that learning is more contextual. Physics education requires supporting elements in its implementation [1]. In addition, the role of physics education an important role in developing students' abilities in relation to the phenomena presented. One of these abilities is problem solving.

Problem solving is important in learning [2]. Someone who is able to solve a problem they face means that they have the ability to problem solver in the future [3]. Problem-solving ability are very much needed by students in constructing the insight to solve problems. Problem-solving ability can be applied by students in complex real-life situations [4]. Therefore, problem-solving ability are necessary for students.

Students with good problem-solving ability can analyze problems, identify solutions, and justify solutions through reflective thinking. Conversely, students with poor problem-solving ability tend to be less active. These students will have difficulty dealing with new problems or unexpected phenomena [5]. In reality, students' problem-solving ability are not yet as good as expected.

Based on initial observations conducted at a senior high school in Padang Pariaman Regency, preliminary tests of students' abilities showed low problem-solving ability among students. The students' problem-solving ability had an average score of 41.67, which is considered adequate. The low level of the students' skills

indicates their difficulty in solving problems and their inability to deal with complex phenomena. This certainly requires attention in developing the quality of students in the future [6]. Problem-solving ability are needed in subjects that require analysis and real-world problem solving. One such subject is global warming.

The global warming material discusses urgent and contextual environmental issues. This material is necessary for students to raise their awareness of global issues and phenomena. The global warming material requires students to analyze the phenomena presented, making problem-solving ability important [7]. Low problem-solving ability indicate students' difficulty in understanding the physics phenomena in this material. Students are not yet fully able to relate physics concepts to real-world problems. This condition shows the need for supporting elements to facilitate students' problem-solving ability in global warming material. One of them is through appropriate learning resources like student worksheets .

Global warming worksheets are one type of printed teaching material that can be used by students. Global warming worksheets are designed to assist teaching and learning activities in producing quality learning [8]. Good worksheets are compiled in accordance with teaching material structure guidelines [9]. Worksheets serve not only as a complement to learning, but also as a means of building students' knowledge. In addition, student worksheet needs to be supported by integration with innovative learning models in order to encourage students to actively build knowledge [10]. In reality, the global warming worksheet used in schools is still informative and procedural in nature.

The existing student worksheet on global warming only focus on presenting material and activity steps. The existing student worksheet contain summaries of material and simple practical steps. This condition prevents students from actively and independently constructing knowledge [11]. The existing student worksheet also does not guide students in analyzing real phenomena and facilitating their needs. The existing student worksheet does not support integration with learning models that encourage students to construct their knowledge. In addition, an analysis was conducted on one of the global warming worksheet in a senior high school in Padang Pariaman Regency.

The existing student worksheet consists of simple activities and does not contain information that can encourage students to deepen their understanding. The student worksheet used has not been integrated with innovative learning models, so it does not encourage students to build their knowledge. The student worksheet contains general information and does not provide reflection on the activities carried out by students. The existing student worksheet is procedural in nature and does not facilitate students in problem solving. This emphasizes the need for attention in developing the quality of students in the future. Therefore, it is necessary to develop global warming worksheet with innovative models that can facilitate students' problem-solving abilities.

Generative learning models based on cognitive conflict (GLBCC) for global warming can be used as an option to facilitate problem-solving ability. This model has the advantage of encouraging students to construct their understanding of problem-solving approaches [12]. This model encourages active student involvement in learning. This student worksheet model focuses on building new understanding by connecting previously known concepts and linking them to information that contradicts previous understanding [13]. Meanwhile, this student worksheet model encourages problem-solving ability on the issue of global warming. Based on the urgency described, it is clear that this research is needed. This research seeks to know the validity and practicality of the global warming worksheet generative learning model based on cognitive conflict to facilitate students' problem-solving abilities.

II. METHOD

Study type conducted was Research and Development (R&D) used to develop and validate educational products [14]. The model of development utilized in this research was the ADDIE model [15]. The ADDIE model is a systematic learning design model. The ADDIE model serves as a framework guideline for developing educational products and other learning resources. In the analysis stage, a performance gap analysis (needs analysis, material analysis, basic competency and indicator analysis) was conducted, the characteristics of the students were analyzed, resources were determined and collected, and a development process plan was made. In the design phase, the student worksheet was designed in the form of an worksheet storyboard.

The development stage involved the validity and practicality of the student worksheet products produced. The validity test components consisted of student worksheet assessment and student worksheet structure with reference to the 2008 Ministry of Education and Culture teaching material development guidelines [16], GLBCC model aspects [17], and problem-solving ability aspects [18]. The student worksheet assessment aspects consisted of indicators of content suitability, language, presentation, and graphics. The student worksheet

structure aspect consists of indicators of title, learning instructions, basic competencies or subject matter, supporting information, tasks or work steps, and assessment. The GLBCC model aspect consists of indicators of orientation syntax, cognitive conflict, disclosure, construction, application, and reflection. The problem-solving ability aspect consists of indicators of identifying problems, identifying several solutions, and justifying solutions.

The practicality test component consists of content that refers to the 2008 Ministry of Education and Culture guidelines for contents, ease of use, and student independence in learning. The content component consists of content appropriateness, language, presentation, and graphics. The ease of use component consists of indicators of increasing student knowledge, ease of use, attractiveness, not requiring teacher assistance, students being able to work independently, and problems presented being relevant to real life. The student independence in learning component consists of indicators of initiative and motivation, learning needs, learning objectives/targets, and relevant learning resources.

The tools used to compile this research are validation sheets and practicality sheets. The validation sheets were compiled based on the components used. Product validation was carried out by three experts who were physics lecturers at the Faculty of Mathematics and Natural Sciences, University of Padang. The practicality of the product was tested by two practitioners and 32 users at a high school in Padang Pariaman Regency. Validity test analysis used scoring for data collection with a 1-4 Likert scale. To analyze the validity test results, Aiken's V formula [19] was used as follows:

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

With $s = r - l_0$

Based on Equation (1), r is a number given by the validator, l_0 is the lowest validity score of 1, c is the highest score of 4, and n is the number of validators. The categories for determining the validity of student worksheet global warming in the cognitive conflict-based generative learning model are v<0.8 with the category invalid and 0.8≤v≤1. The practicality test analysis is processed using the following formula:

$$Practical\ Value = \frac{the\ score\ obtained}{score\ maximun} x\ 100\% \quad (2)$$

Based on Equation (2), the practicality score interpretation category used is 100 on a five-point scale. The categories for determining the practicality of the student worksheet on global warming using a generative learning model based on cognitive conflict consist of the 0-20% interval with the category very impractical, the 21-40% interval with the category impractical, the 41-60% interval with the category very impractical, the 61-80% interval with the category practical, and the 81-100% interval with the category very practical.

III. RESULTS AND DISCUSSION

RESULT

The results of the study are the stages of the ADDIE development model, which consist of the analysis, design, and development stages (product validity and practicality).

1. Analysis Phase

The results of the needs analysis sheet show that the student worksheet used is still informative in nature and does not activate learning activities that build students' knowledge. Students have not had learning experiences that require them to resolve conflicts of understanding, engage in proofing activities, or conduct independent evaluations. The absence of activities that encourage students to explore phenomena, identify inconsistencies in understanding, and consider alternative solutions indicates that the student worksheet used does not facilitate students' problem-solving ability. Students demonstrate a need for student worksheet that not only presents material but also encourages them to build knowledge. student worksheet that guides them to experience conflicts of understanding, prove, discuss, and formulate solutions to problems.

The results of the material analysis show that the material on global warming is conceptual and abstract. The material covers the greenhouse effect, carbon emissions, climate change, and environmental impacts. The complexity of this material can be seen from the many interrelationships between the phenomena. This material requires students to understand the phenomenon of global warming in depth. Students need to analyze

phenomena to build knowledge. This condition shows that global warming material challenges students to be actively involved in the thinking process. Global warming material requires problem identification, identification of several solutions, and accountability for solutions.

The results of the analysis of basic competencies and indicators show that learning outcomes related to global warming are relevant to the competency requirements of the curriculum. Learning outcomes include the skills and analysis required by students in global issue-based phenomena. The indicators are tailored to the needs of students through learning objectives. This condition is tailored to the needs of students in building knowledge. CP and TP show compatibility with the student worksheet developed to facilitate students' problem-solving abilities.

The results of the identification of student characteristics show that there are 32 students in grade X, consisting of 12 males and 20 females. Students use textbooks as teaching materials during the learning process. Students are not very active in learning, so they need to be facilitated. In addition, students' problem-solving ability on the topic of global warming are still not very good. The students' initial problem-solving ability on the topic of global warming had an average score of 41.67, which is considered poor. This shows that students have difficulty identifying problems, identifying several solutions, and justifying solutions to existing problems. The characteristics of the students require learning support that encourages student activity. Students who are less actively involved tend to have limitations in developing problem-solving steps. This condition indicates that students need teaching materials that encourage knowledge-building activities.

The results of the analysis of determining and collecting resources show that the developed student worksheet requires material resources, video resources, and supporting development resources. The results of the analysis of the development process plan show that the student worksheet development process plan is structured systematically, effectively, and regularly. The evaluation at the analysis stage has shown that the adequacy of the data and information needed has led to the development of the student worksheet.

2. Design Phase

The results of the design stage are in the form of a storyboard and an evaluation of the design stage. The storyboard consists of concept and design plans in the form of simple charts. Researchers design the contents of the student worksheet, starting from the cover, introduction, tasks or work steps and phases of the GLBCC learning model, and assessment. The cover consists of the title of the student worksheet, the names of the authors and supervising lecturers, and the name of the university. The introduction consists of a foreword, subject identity, learning outcomes, and learning objectives. Supporting information consists of group identity, learning instructions, learning objectives, and materials. Tasks or work steps consist of syntax in the cognitive conflict-based generative learning model. Assessment consists of exercises in the form of tasks and developer profiles.

The evaluation at the design stage shows that the student worksheet has been adapted to the needs. The developed student worksheet fulfills the components consisting of the student worksheet structure, learning model phases, and objectives to be achieved. Each component of the student worksheet design is feasible to proceed to the prototype stage. This is based on the initial design that has met the requirements to be made systematically.

3. Development Phase

The development stages carried out included the creation of an student worksheet prototype, validation of the student worksheet prototype, revision of the student worksheet prototype, and practicality of the student worksheet.

a. Development of student worksheet prototype

The student worksheet was created based on the storyboard that had been prepared beforehand. The student worksheet consists of a cover containing the front page of the physics student worksheet entitled “Generative Learning Based on Cognitive Conflict: Global Warming,” an introduction, activities in the student worksheet, and developer profiles, as shown in Figure 1.

Fig. 1. Cover of The Student Worksheet

b. Validation of student worksheet Prototype

The results of this analysis stage are the validation scores from three experts from the Faculty of Mathematics and Natural Sciences, University of North Sumatra. The validation components used cover four aspects, namely student worksheet assessment, student worksheet structure, GLBCC model aspects, and problem-solving ability aspects. The validation results for the first component are the student worksheet assessment aspect (PL), which consists of indicators of content suitability (KI), language (KH), presentation (PJ), and graphics (KG). The results of the analysis of the student worksheet assessment aspect can be seen in Table 1.

Table 1. Results of the Analysis of student worksheet Assessment Aspects (PL)

Indicator	Value	Description
Content suitability (KI)	0.91	Valid
Language (KH)	0.94	Valid
Presentation (PJ)	0.86	Valid
Graphics (KG)	0.89	Valid
Total Average	0.90	Valid

Based on Table 1, it can be explained that the results of the validity test of the GLBCC learning model global warming worksheet in terms of assessment have a variation in scores between 0.86 and 0.94. The scores given by the validators for each aspect of the worksheet assessment can be categorized as valid. The average validity test results for the GLBCC global warming learning model student worksheet were 0.90, which is categorized as valid. Therefore, the GLBCC global warming learning model student worksheet in terms of student worksheet assessment is valid. The validation results for the second component were the student worksheet structure aspect (SL), which consisted of the title indicator (JL), learning instructions (PB), basic competencies or subject matter (KCM), supporting information (IP), tasks or work steps (TLK), and assessment (PN). The results of the analysis of the student worksheet structure aspect component are shown in Table 2.

Table 2. Results of The Analysis of The student worksheet Structure Aspect Component (SL)

Indicator	Value	Description
Title (JL)	1.00	Valid
Learning Intructions (PB)	0.89	Valid
Basic Competencies or Subject Matter (KCM)	0.89	Valid
Supporting Information (IP)	0.89	Valid
Tasks or Work Steps (TLK)	1.00	Valid
Assessment (PN)	1.00	Valid
Total Averange	0.90	Valid

The results of data analysis in Table 2 show that the validity test results of the GLBCC learning model global warming on the student worksheet structure indicators have a variation in values between 0.89 and 1.00. The values given by the validator for each student worksheet structure indicator are categorized as valid. The

average validity test result for the GLBCC global warming learning model student worksheet is 0.94, which is categorized as valid. Therefore, the GLBCC global warming learning model student worksheet is valid in terms of student worksheet structure assessment. The validation results for the third component are aspects of the GLBCC (FP) model, which consist of indicators of the orientation phase (FO), cognitive conflict phase (FKK), disclosure phase (FP), construction phase (FK), application phase (FA), and reflection phase (FR). The results of the analysis of the GLBCC model aspects are shown in Table 3.

Table 3. Results of The Analysis of The GLBCC Model Aspects (FP)

Indicator	Value	Description
Orientation Phase (FO)	0.89	Valid
Cognitive Conflict Phase (FKK)	0.89	Valid
Disclosure Phase (FP)	0.96	Valid
Construction Phase (FK)	0.81	Valid
Application Phase (FA)	0.89	Valid
Reflection Phase (FR)	0.89	Valid
Total Averange	0.89	Valid

Table 3 shows that the results of the validity test of the GLBCC global warming learning model student worksheet on the GLBCC model aspect have a value variation between 0.81 and 0.89. The values given by the validator for each indicator of the GLBCC model phase are categorized as valid. The average result of the validity test of the GLBCC global warming learning model student worksheet is 0.89 with a valid category. Therefore, the GLBCC learning model global warming worksheet for the GLBCC model phase assessment aspect is valid. The validation results for the fourth component are the problem-solving ability (PV) aspect, which consists of the indicators of identifying problems (IM), identifying several solutions (IB), and justifying solutions (TS). The results of the analysis of the problem-solving ability aspect are shown in Table 4.

Table 4. Results of The Analysis of The Problem-Solving Ability Aspect (PV)

Indicator	Value	Description
Identifying Problems (IM)	0.89	Valid
Identifying Several Solutions (IB)	0.89	Valid
Justifying Solutions (TS)	0.89	Valid
Total Averange	0.89	Valid

Based on Table 4, it can be explained that the validity test results of the GLBCC learning model student worksheet on the aspect of problem-solving skills have a value of 0.89 for all indicators. The scores given by the validators for all indicators were categorized as valid. The average validity test score for the GLBCC global warming learning model student worksheet was 0.89, which is categorized as valid. Therefore, the GLBCC global warming learning model student worksheet in terms of problem-solving skills assessment is valid. The average validity test results for the GLBCC learning model student worksheet for global warming consist of the student worksheet assessment aspect (PL), student worksheet structure (SL), GLBCC model phase (FP), and problem-solving ability (PV) components. The average validity test results for all student worksheet components are shown in Table 5.

Table 5. Average Validity Test Results for All student worksheet Components

Component	Value	Description
Student Worksheet Assessment Aspect (PL)	0.90	Valid
Student Worksheet Structure (SL)	0.94	Valid
GLBCC Model Phase (FP)	0.89	Valid
Problem-Solving Ability (PV)	0.89	Valid
Total Averange	0.91	Valid

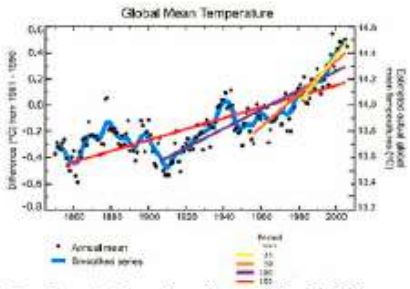
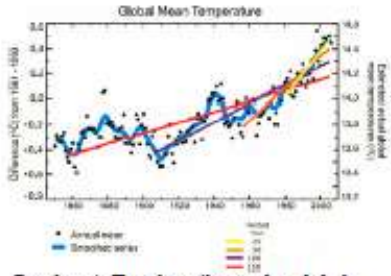
Table 5 shows that the average validity test score for the GLBCC global warming learning model student worksheet ranged from 0.89 to 0.94. The highest validity assessment score for the GLBCC global warming learning model student worksheet was obtained for the student worksheet structure assessment aspect, with a score of 0.94. The validity assessment aspect that received the lowest score was the GLBCC model phase and problem-solving ability, with a score of 0.89. Overall, the average score for the validity test results for all assessment aspects was 0.91. Based on the average score obtained, the validity test results for the global warming student worksheet in the GLBCC learning model are classified as valid. This indicates that the GLBCC

learning model student worksheet on global warming that has been developed system has been verified for its viability and can be applied in the teaching learning process at school.

c. Revision of the Student Worksheet Prototype

During the student worksheet prototype validation stage, suggestions and feedback were obtained from validators. The following is an example of student worksheet revisions based on corrections from validators, which can be seen in Table 6.

Table 6. Revisition of The student worksheet Prototype

<table>
<tr><td>Revition of The LKPD Prototype</td></tr>
<tr><td>Every image or graph provided must be accompanied by an explanation of its meaning.</td></tr>
<tr><td>Before Revisition</td></tr>
<tr><td>No explanation of the meaning of the image or graph has been added yet.</td></tr>
<tr><td>Fase Konflik Kognitif
Baca dan amatilah gambar dibawah ini!
 
Gambar 3. Penggunaan AC
Sumber: https://www.sonora.id
Link: https://acesse.one/1uEtg
 
Gambar 4. Tren kenaikan suhu global
Sumber: https://geoenviron.wordpress.com</td></tr>
<tr><td>After Revisition</td></tr>
<tr><td>Added explanations for each image or graphic</td></tr>
<tr><td>Fase Konflik Kognitif
Baca dan amatilah gambar dibawah ini!
 
Gambar 3. Penggunaan AC
Sumber: https://www.sonora.id
Link: https://acesse.one/1uEtg
 
Gambar 4. Tren kenaikan suhu global
Sumber: https://geoenviron.wordpress.com
Gambar 3. Penggunaan produk AC di perkotaan untuk menyejukkan ruangan agar terasa nyaman.
Gambar 4. Grafik tren kenaikan suhu global menunjukkan suhu bumi terus meningkat dari tahun ke tahun.</td></tr>
</table>

d. Praktikality of Student Worksheet

The practicality test was conducted on two practitioners and 32 users of the developed student worksheet. The practicality component consists of three aspects, namely content, ease of use, and student independence in learning. The results of the practicality test on the first component were the content aspect (IS), which consisted of indicators of content feasibility (KI), language (KB), presentation (PJ), and graphics (KG). The results of the practicality test on the content aspect by practitioners can be seen in Table 7.

Table 7. Results of The Practicality

Indicator	Value (%)		Description	
	Practitioners	User	Practitioner	User
Contents (IS)	97.66	87.99	Very Practical	Very Practical
Ease for Use (KP)	100	88.15	Very Practical	Very Practical
Student Independence in Learning (KB)	100	87.89	Very Practical	Very Practical
Total Averange	99.22	88.01	Very Practical	Very Practical

Table 7 shows that the results of the practicality test of the GLBCC global warming student worksheet model in terms of content received a score of 97.66% from practitioners in the very practical category and a score of 87.99% from users in the very practical category. The results of the practicality test of the GLBCC model global warming student worksheet in terms of ease of use received a score of 100% from practitioners in the very practical category and a score of 88.15% from users in the very practical category. The results of the practicality test of the GLBCC model global warming student worksheet in terms of student learning independence had a score of 100% by practitioners in the very practical category and a score of 87.89% by users in the very practical category. The average results of the practicality test of the GLBCC model global warming student worksheet for all aspects had a percentage score of 99.22% by practitioners in the very practical category and a percentage score of 88.01% by users in the very practical category. This shows that the results of the practicality test of the GLBCC model global warming student worksheet have content, ease of use, and student learning independence that are very feasible according to practitioners and users in facilitating students in learning Physics, especially on the subject of global warming. In addition, the GLBCC model global warming student worksheet can be used by students to facilitate problem-solving ability.

e. Evaluation

The student worksheet product that was developed has been validated by the validator. The validity of this product is based on improvements made to the prototype. Each revision was followed up before being tested by users. The student worksheet was tested by practitioners and users to measure the practicality of the product. The practicality test shows that the developed student worksheet is very practical to use. This indicates that the developed student worksheet is not only theoretically valid but also feasible and very practical for use in Physics learning.

DISCUSSION

1. Result Achieved

The purpose of this study is to determine the practicality of student worksheet products on global warming using a valid and practical generative learning model based on cognitive conflict. The products were developed using the ADDIE development model, which consists of the Analyze, Design, and Development stages. The analysis stage produced information about the students' needs for student worksheet used in physics learning. This is in accordance with the opinion [20] that analysis is important to identify the main problems and determine the aspects that need to be developed to ensure the quality of student worksheet. The design stage produced a storyboard of the product. The development stage produced a product prototype, validity assessment, and practicality of student worksheet.

The resulting student worksheet consists of a title, learning instructions, competencies to be achieved, supporting information, tasks or work steps, and assessments. This is in line with [21] regarding the structure of student worksheet in teaching materials. Student worksheet was developed using a generative learning model based on cognitive conflict (GLBCC) with syntax orientation, cognitive conflict, disclosure, construction, application, and reflection. The student worksheet in the GLBCC model is assessed through validation tests by experts and practicality tests by practitioners and users.

The validation test was conducted by reviewing several aspects, namely student worksheet assessment (PL), student worksheet structure (SL), GLBCC model phase (FP), and problem-solving ability (PV). The validation test was conducted to identify the strengths and weaknesses of the developed student worksheet. The student worksheet assessment component aims to determine its suitability with the development of teaching materials by the Ministry of Education and Culture in 2008. The student worksheet structure component aims to determine its conformity with the student worksheet structure by Pratowo in 2011. The GLBCC model phase component aims to determine the conformity of the student worksheet with the GLBCC model syntax. The

problem-solving ability component aims to determine the conformity of the student worksheet with the facilitated abilities.

Student worksheet validation is used to determine the feasibility of student worksheet and as a guideline in revising the product that has been created. The validation test results for the student worksheet assessment component is 0.90, which is considered valid. This shows that the student worksheet that has been created contains content, language, presentation, and graphics that are appropriate to the needs. The validation test results for the student worksheet structure component were 0.94, which is considered valid. This shows that the student worksheet that was created is in accordance with the student worksheet structure as teaching material.

The validation test results for the GLBCC model phase components were 0.89. This shows that the student worksheet created contained topics based on the GLBCC learning model syntax, as stated in [22] that GLBCC learning has six syntaxes, namely orientation, cognitive conflict, disclosure, construction, application, and reflection. The student worksheet in this model has enabled the promotion of learning activities. This student worksheet model emphasizes the active role of independent knowledge by students in the learning process [23]. The validation test results for the problem-solving ability component were 0.89, which is considered valid. This shows that the student worksheet created contains activities that facilitate students in problem solving. This model has the advantage of encouraging students to construct their understanding through a problem-solving approach. Students are actively involved in problem solving through learning so that they can build new understanding by connecting previously known concepts and then linking them with information that contradicts their initial understanding [24].

The results of this study show that the validity of the global warming student worksheet generative learning model based on cognitive conflict to facilitate students' problem-solving skills is valid with an average score of 0.91. The student worksheet is declared valid because the assessment is in accordance with the teaching material guidelines, the existing student worksheet structure, meets the syntax in the GLBCC learning model, and facilitates problem-solving skills. Product validation is a process of testing the validity of teaching materials through assessment by several experts [25]. The assessment components of validation must be relevant and consistent with the theory used in the preparation of teaching materials. These results are in line with the research [26] that valid student worksheet can be used to support the physics learning process.

Practicality tests were conducted by reviewing several aspects, namely content (IS), ease of use (KP), and student learning independence (KB). Practicality tests were conducted to determine the practicality of the student worksheet produced [27]. The content component aimed to determine the suitability of teaching materials with the 2008 Ministry of Education and Culture [28]. The ease of use component aims to determine the extent to which the student worksheet facilitates learning activities. The student learning independence component aims to determine the suitability of the student worksheet for use in student learning activities.

The results of the practicality test on content components by practitioners were 97.66% in the very practical category, while by users they were 87.99% in the very practical category. This shows that the student worksheet is very practical in terms of content, language, presentation, and graphics. The results of the practicality test for the ease of use component by practitioners was 100% in the very practical category, while by users it was 88.15% in the very practical category. This shows that the student worksheet produced is very practical in providing convenience for students as teaching materials. Feasibility test results for practicality test for the component of student learning independence by practitioners were 100% in the very practical category, while by users it was 87.89% in the very practical category. This shows that the student worksheet produced is very practical in helping student learning independence.

The results of this study show that the practicality of the student worksheet on global warming using a generative learning model based on cognitive conflict to facilitate students' problem-solving ability is very practical, with a score of 99.22% by practitioners and 88.01% by users. The student worksheet is considered highly practical because it is appropriate in terms of content, easy to use, and suitable for supporting student independence in learning. This is in line with the opinion [29] that a test is said to have high practicality if it is practical in nature. The practicality assessment component must provide practicality in the use of teaching materials. Overall, the student worksheet on global warming in the generative learning model based on cognitive conflict is very practical for use in physics learning.

2. Research Limitation

This study has several limitations that affect the scope of the development result. The first limitation lies in the application of the generatif learning model worksheet based on cognitive conflict, which is still limited to the topic of global warming. This limitation occurated because the time available for research was limited during the development process. To overcome this limitation, it is recommended that similiar student worksheet be developed for various other physics materials so that the resulting products are more varied.

The second limitation of the study is that the development of student worksheet was only carried out up to the stage of testing the practicality of the product. This limitation occourred because the available research time was relatively short. To overcome this limitation, it is recommended that this research be continued by other researchers by conducting more extensive product trials to obtain information about the effectiveness of the student worksheets. Thus, not only the validity and practicality will be tested, but also the effectiveness of the student worksheet in supporting physics learning in schools.

IV. CONCLUSION

Based on the practicality study data collected, it can be said that this study produced a global warming student worksheet generative learning model based on cognitive conflict to facilitate students' problem-solving skills that are very practical based on three aspects, namely content, ease of use, and student learning independence. The the validity test result is valid with an average score of 0.91. The practicality test results show that the LKPD is very practical to use, with a score of 99.22% by practitioners and 88.01% by users. The research results conclude that the developed student worksheet is very practical to use to support Physics learning. This student worksheet model can be used as an alternative teaching material that facilitates problem-solving skills in supporting the physics learning process.

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