

STUDY OF 4C COMPONENTS THE AVAILABILITY AT PHYSICS WORKSHEETS OF SENIOR HIGH SCHOOL GRADE XII IN PESISIR SELATAN

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ABSTRACT

The 2013 curriculum requires teachers to encourage students to be able the 21st century skills consist critical thinking, creativ thinking, communicaton, and collaboratively. To achieve this, teacher must practice using learning strategies with an orientation to train students to be able have 4C skills. This relates to the learning component that must be prepared by the teacher such as teaching materials. The aim of research was conducted to study the availability of the 4C component at physics worksheets of senior high school for XII. The population of data in this study were physics worksheets class XII made by teacher. The samples in this research are fourth Physics worksheets made by physics teacher. The data in this study were taken using physics worksheets presentation analysis instrument with the data analysis technique is a content study and data collection techniques through documentation studies. Based on the analysis result, it can be concluded the analysis of the Physics Worsheets at Senior High School for XII related to availability of the 4C component shows that physics worksheets who obtained a percentage with the fulfillment of the indicator on the highest 4C component is critical thinking indicators obtained a score 59% with category enough facilitated and the lower is collaboration get a score 42,71%.

Keywords : Study; 4C; Physics Worksheets



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I. INTRODUCTION

In law number 20 of 2003, Education is a planned effort and conscious to create an atmosphere of learning and learning process so that students actively contribute their potential to have a spiritual strength, self-control, personality, intelligence, noble character and skills needed by themselves, society, the nation and the state. 21st century education wants quality human resources in order to get superior result that can compete globally in the 21st century. The demans of 21st century education are being able to create education that can produce human resources who are capable of critical thinking and problem solving, able to communicate and collaborate, as well as the ability to create and renew^[1].

Learning carried out in Indonesia on average has used the 2013 revised 2017 curriculum. In the 2013 revised 2017 curriculum there are several important points including strengthening character education (PPK), 4C skills, literacy and Higher Order Thinking Skills (HOTS). Because the curriculum is a competency-based curriculum that is indispensable as an instrument to guide students to students become: (1) qualified human beings so they can respond to challanges of the ever-changing times; (2) educated human beings who believe and feat the almighty God, have noble character, are healthy, knowledgeable, capable, creative, independent; and (3) democratic and responsible citizens^[2]. This statement is the same as the demands of the 21st century state taht education does not only emphasize cognitive aspects, but aspect of the attitudes and skills are also the main capital in global competition in this century. For to faced global competition, in education each student was trained to 21st century skills that the emphasize the ability of each student be able to critically think in problem solving habe idea and innovation, be able team worl and communicated^[3].

The government will facilitate learners to have skills to face global competition. As for these skills in the curriculum 2013 revision 2017 namely 4C skills (critical thinking, creativ thinking, collaboration and commuication), so students should be able to work in a team with a good , innovative and creative, critacal thinking in problem solving and subsequent capable communicate well. So it can be concluded taht the 4C component is very important for student by starting to be trained and developed in a lesson. The 2013 curriculum seeks to further inculcate the values reflected in attitudes so that they are directly proportional to the skills students acquire through knowledge in school. In other word, soft skills and hard skill can run in a balanced way, side by side, and are expected to be able to be implemented in everyday life. One of the lessons that use critical and creativ thinking skills is Physics.

Physics is a branch of science that underlines the development of technology and the concept of living in harmony with nature. As a science that studies natural phenomena, physics also provides good lessons for humans to life in harmony based on natural laws. The objectives of learning physics as stated in the 2013 curriculum are to master concepts and principles of physics, haave the skills to develop knowledge and a confident attitude as provisions for contiuiung education and a references in developing science and science technology^[4]. 4C skills are needes so that students are able to face and adapt to the challenges of increasingly in their enviroment by utilizing critical and creative thinking skills that students can develop in facing the challenges of the 21st century. On of the learning resources that encourage the physics learning process is a worksheet.

Student worksheet are sheets containing assignment that must be done by students. Students worksheets can be in the form of guides for cognitive aspect development exercises as well as guides for the development of all aspect of learning in the form of experimental or demonstration guides^[5]. Student worksheet contains activities that students must do to maximize better understanding and creativity. The achievement of using student worksheets depends on the student worksheet presentation that the teacher gives to students. The worksheets used must caintain 4C skill indicators so that the expected abilities can be realized.

Worksheets is also one of teaching that can be modified according to the needs and goals of 21st century skills the in accordance with existing demans and of course must still follow the guidekines for developing teaching materials have been regulated by ministry of nasional education. In the modifying LKS, educators can be adapt to the demans of 21st century skills. One of the 21st century skills is the 4C skills, namely critical thinking skills, communication skill, collabotation skill and creativity skill^[6].

Critical thingking is thinking well and exploring and analyzing well a problem at hand. School must teach students the correct way of thinking^[7]. On the other hand, critical thinking is an organized process that allows students to evaluate evidence of assumption, logic and language that underlie other people's statements. Ennis in Djamas Djusmaini^[8] has identified 12 indicators of critical thinking that the grouped into five major activities in learning process. These activities incude; provide a simple explanation, build basic skills, concludes, provide further explanation and set strategies and techniques.

Creative thinking skill is the ability to generate new ideas or methods is producing a product. Creative is a new combination of idea, production, color, texture, art, and literature that mankind needs^[9]. According to Munandar^[10] creativity can be seen as a product of human or behavior and as a thought process consisting of various ideas in dealing with a problem. Creativity is also seen as a process of playing woth ideas or elements in the mind so that it is an activity that is full of challanges for creative students.

Collaborative in learning is two more people in certain situation when learning and trying to learn^[11]. People who are involde in collabotaive learning make use of the resources and skills possessed by others in a group, for example asking for information, valuing each other ideas and monitoring each other work^[11]. The active learning process has an important role in helping students acquire various thinking skills such as creativity, collaboration and good communication. The form of active learning occur where students not only listen and record knowledge from the teacher, but can develop the knowledge obtained through the question asked so that active discussions between students and teachers created^[13].

Communication is an activity to transfer informastion in the form of written or oral from by conveying it well^[14]. Active learning can be implemented properly if the students has a skills, good communication^[15]. According to Ngalim^[9] the indicators assesed in communication skills are written communicatin indicators which include the ability to use spelling, use punctuation, word formation, effective sentences and form paragraph.

Based on the background of description problem in this article, discussing and explaining the percentage of the availability of the 4C component in the Physics Worksheets of Senior High School class XII can facilitate the learning process.

II. METHOD

The type of reserach conducted is descriptive research and the the approach is qualitative approach in the presentation of the research result. Descriptive research is research that aims to describe or explanation an existing phenomenon. In this study, what described 4C components contained in physics worksheets class XII. The population in this study was the physics worksheet class XII used in Pesisir Selatan. The sampling technique used is non probability sampling which is purposive sampling type, where this technique is used certain objectives and considerations. The sample in this study 4 student worksheets at senior high school class XII made by physics teacher.

The research procedure is devided into 3 stages,namely the preparation,implementation and completion. In this research, researcher used an instrument for the analyze the availability of 4C component in physics student worksheet class XII. The research instrumen used in this research is an analysis sheet in the form of a statement regarding the presentation student worksheets related to the 4C component which is tested validity.

The validity of instrument assesed by 3 expert lecturers using instrument validation sheet. The assesment of validity instrument for the availability 4C component in physics student worksheet in the form a checklist wit a scale of 1 to 5. The highest score for each indicator is 5 and the lowest score is 1. The overall result of the validity assesment use the Kappa Cohen with the equation ;

$$\text{Moment Kappa} = \frac{P_o - P_e}{1 - P_e} \quad (1)$$

The symbol k in the equation represent the moment kappa. The Po symbol show the realized proportion which is calculated by dividing the total value given by the validator devided by maximum number. Meanwhile Pe shows the unrealized propoertion is calculated by substracting the maximum number of values by total value given by the validator. The kappa moment decision categories obtained are in Table 1.

Tabel 1. Decision Category Based on Kappa Moment (k)

Interval	Category
0.81 – 1.00	Very Valid
0.61 – 0.80	Valid
0.41 – 0.60	Neutral
0.21 – 0.40	Less Valid
0.01 – 0.20	No Valid

(Source : Riduwan [16])

The data collection techniques in this research is documentation study. The data analysis technique used is content study. Content study is a procedure used to draw valid conclusion from a book or document^[17]. This analysis technique is carried out by adding up the 4C components that appear in the analyzed worksheets. Next calculate the percentage of presentation physic student worksheet class XII which facilitates the availability of 4C component. The percentage obtained then adjusted to the criteria for presenting student worksheets. The criteria was listed in Table 2.

Tabel 2. Criteria of Physics Worksheets Class XII Related 4C Components

Percentage Interval	Criteria
81 – 100	Very Facilitated
61 – 80	Facilitate
41 – 60	Simple Facilitated
21 – 40	Less Facilitated
0 – 20	No Facilitataed

(Source : Riduwan[16])

III. RESULTS AND DISCUSSION

A. Research Result

The study entitled Study of Availability of 4C Component in the Presentation of Physics Student Worksheets for class XII SMA in Pesisir Selatan with many samples of 4 product of student worksheets used as teaching material at school. 21st century skills namely 4C abilities of student are expected to be able to develop the abilities and potential that exist within themselves and be able to develop the competencies that student have in accordance availability category for each material on the student worksheet. The 4C component availability category can be seen in Figure 1.

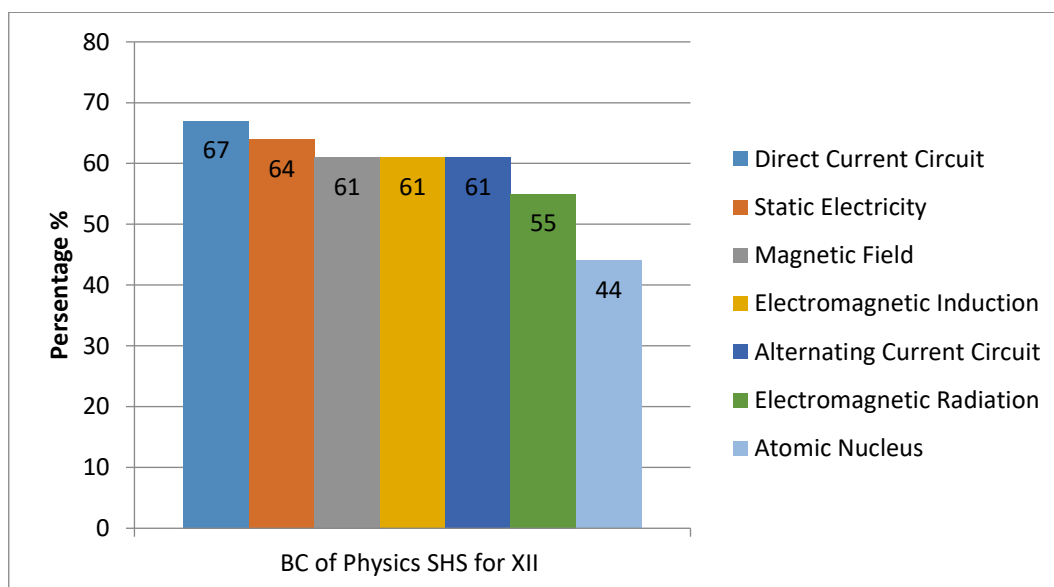


Fig 1. Percentage of Average Score Availability of Critical Thinking Indicators on Physics Material Class XII

Figure 1 illustrates the results of the analysis of critical thinking indicators in class XII Physics material, it can be seen that critical thinking indicators on Dirrect Current Circuit material are in the category of sufficient to facilitate obtaining an average score of 67%. While the Atomic Nucleus material obtained a score of 44% with the category of less facilitating. Furthermore, the student worksheets analyzed is creative thinking indicators the following result of the analysisi of the presentation can be seen in Figure 2.

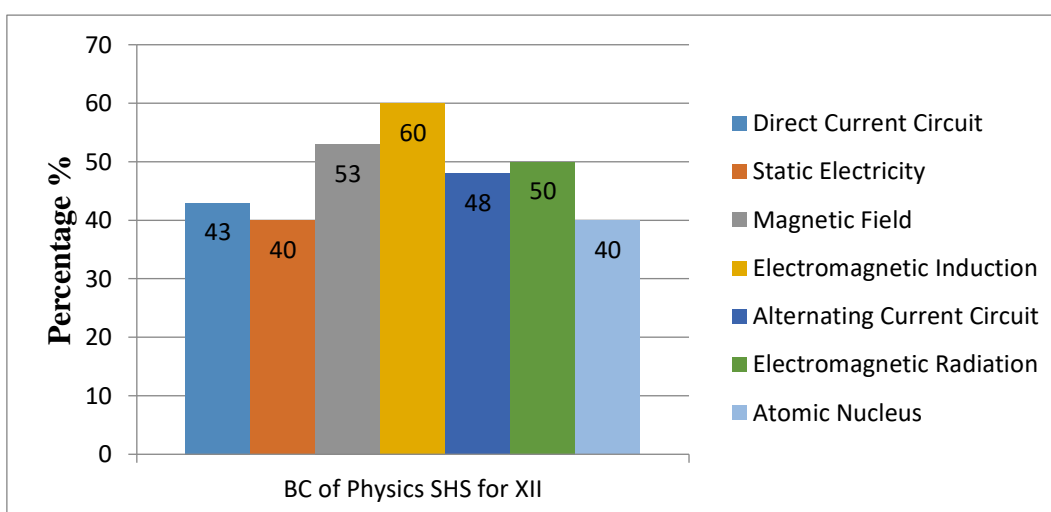


Fig 2. Percentage of Average Score Availability of Creative Thinking Indicators in Physics Material Class XII

Figure 2 illustrates the results of the analysis of creative thinking indicators in class XII Physics material, it can be seen that critical thinking indicators on Magnetic Induction material are in the category of sufficient to facilitate

obtaining an average score of 60%. While the Atomic Nucleus material obtained a score of 40% with the category of less facilitating. The result of the next communication indicators analysis on communication indicators can be seen in Figure 3.

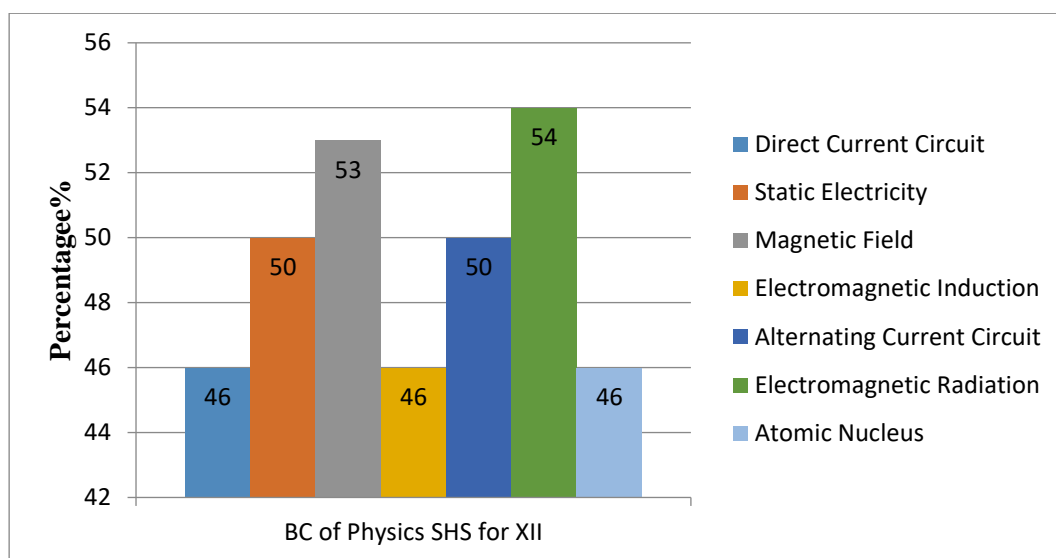


Fig 3. Percentage of Average Score Availability of Communication Indicators in Physics Material Class XII

Figure 3 illustrates the results of the analysis of communication indicators on the material of Physics class XII, it can be seen that the communication indicators on the material of Electromagnetic Radiation are in the category of sufficient to facilitate obtaining an average score of 54%. Meanwhile, in the Atomic Nucleus and Magnetic Induction material, the lowest score was obtained with 46% in the category of moderately facilitating. It can be seen that the results of the analysis of communication indicators are still included in the category of quite facilitating, this is indicated by the lack of communication indicators appearing in the analyzed worksheets. Furthermore, the result of the analysis of the collaboration indicators in physics material can be seen in Figure 4.

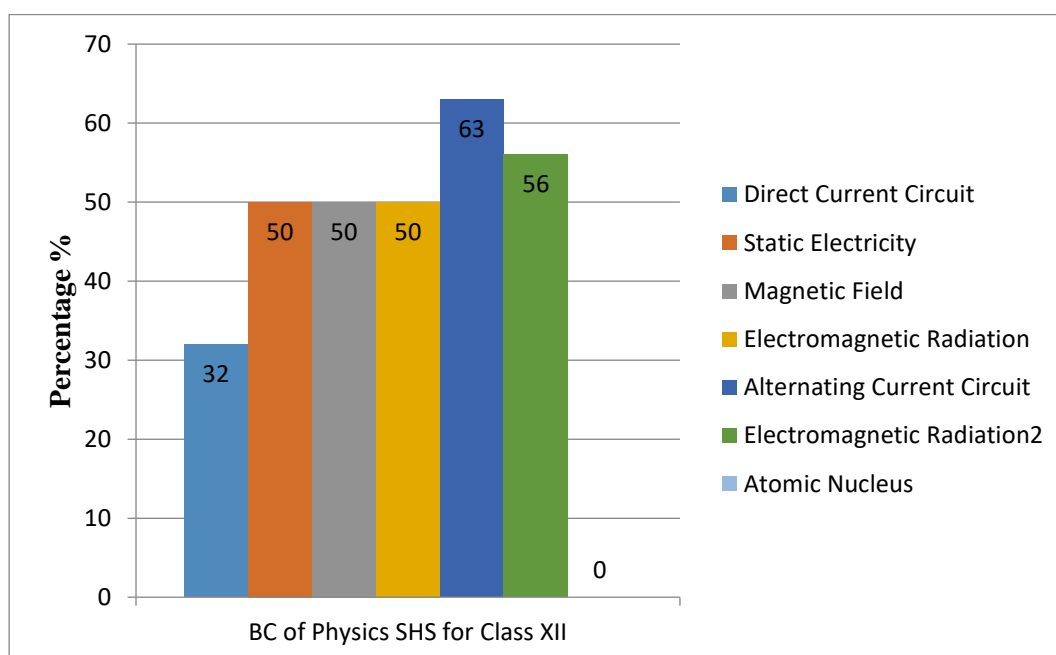


Fig 4. Percentage of Average Score Availability of Collaboration Indicators in Physics Material Class XII

Figure 4 illustrates the results of the analysis of collaboration indicators on the material of Physics class XII, it can be seen that the indicators of collaboration on the Alternating Current Circuit material with the category of being able to facilitate obtaining an average score of 63%. While in the Atomic Nucleus material there is no collaboration indicator so that it gets the lowest score with 0% in the non-facilitating category. It can be seen that the results of the analysis of communication indicators are still included in the category of quite facilitating, this is indicated by the lack of collaboration indicators appearing in the analyzed LKS presentations.

B. Discussion

The study of the availability of the 4C component in physics student worksheet for class XII aims to determine the availability of the 4C component in the presentation of physics student worksheets for class XII. The 4C components include critical thinking, creative thinking, communication skill and collaborative skills. These four components must be owned by student which have been outlined in the 2013 curriculum in accordance with the demands of the 21st century.

The analysis of the presentation of the Physics Worksheets which is associated with the availability of 4C components aims to determine the existence of 4C indicators such as; critical thinking, creative thinking, communication skills, and collaboration skills in presenting the contents of the XII class XII high school Physics worksheet used by schools in Pesisir Selatan. It is very important that the worksheets contains the 4C component in it. One of them is to be able to train students thinking skills ranging from critical thinking, good creative, communication skills and collaboration skills. After analyzing the presentation of the worksheets related to the 4C component, the results of the assessment on the components of the four worksheets were obtained. Not all LKS contain the 4C components completely, the LKS analyzed have advantages and disadvantages in each of the 4C indicator components. For the analysis of the worksheets presentation related to the 4C component, the first analysis is on the critical thinking indicators presented in every physics material in class XII.

The first analysis carried out in this study was to select several worksheets to be analyzed. The student worksheets analyze are physics worksheets for class XII used in learning process. The student worksheets analysis was adjusted to the critical thinking indicators so that it was obtained that the four Physics Worksheets had included the expected critical thinking indicators. Physics Worksheets that has high critical thinking skills. The application of critical thinking is expected that students are able to analyze and solve a problem critically, therefore students must add literacy insights in order to add to their knowledge ^[18].

Creative thinking skills in the Physics Worksheets analyzed were found to be still in the category of less facilitating. So that there are weaknesses in the Physics Worksheets that are not optimal in training creative thinking skills. Creative thinking skills can act as a liaison between students and their environment. The application of creative thinking on student worksheets aims for students to know how to do things in a different way from the previous way, and students have creative ideas not only knowing one way to be able to compete in the conditions of the world that is developing globally at this time ^[19].

Collaboration skills in student worksheets must be mutually sustainable between learning materials and conditions in the daily environment. Collaboration skills are expected to be able to apply students' willingness to cooperate with others, because by working together success will be obtained optimally. In addition, through student worksheets, it is expected that students can practice communication skills in learning, meaning how students communicate with other people so that they can listen, respect the opinions of others ^[14].

IV. CONCLUSION

Based on the results of the analysis of the availability of the 4C components studied, Based on the research that has been done, it can be concluded that the highest skills possessed by the 4 LKS are critical thinking skills with an average percentage of 59, creative thinking skills obtained an average of 49, communication skills are 49.28 and skills collaboration obtained 42.71. Thus it can be concluded that the four components already contain the four components in accordance with what is expected in the 21st century but are still in the category of sufficient to facilitate with the highest skills possessed by the four LKS are critical thinking skills and low skills, namely collaboration skills.

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