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Siri 4**

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EDITOR:
ALIAS MASEK



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PRAKATA

Siri ke empat kali ini mengutarakan penggunaan beberapa kaedah pengajaran yang berbeza-beza, mencakupi kajian berkaitan pembelajaran dari pra-sekolah, peringkat sekolah, kolej vokasional hingga ke peringkat pengajian tinggi. Cakupan kandungan juga meluas dari penggunaan modul kepada penggunaan teknologi canggih dalam pengajaran dan pembelajaran. Di samping itu juga, siri ini turut menyentuh tentang amalan dan persepsi pelajar terhadap pembelajaran.

Pada abad 21 ini, penggunaan teknologi canggih menjadi kemestian dalam pengajaran dan pembelajaran. Menyedari hakikat ini, artikel pertama dari Azita dan Izuwan mengutarakan pembangunan permainan untuk pembelajaran menggunakan telefon pintar untuk kegunaan kanak-kanak pra-sekolah. Manakala Fazlinda et al. pula menggunakan media interaktif dalam mata pelajaran reka bentuk dan teknologi. Menyedari teknologi ini juga ada kesan sampingan, Siti Khadijah et al. mengkaji tentang implikasi penggunaan permainan digital dan bukan digital terhadap motivasi, tumpuan dan kemahiran pelajar.

Bagi memastikan pembelajaran berkesan, model-model khusus harus digunakan dalam sesi pengajaran dan pembelajaran dibantu oleh penggunaan modul. Artikel dari Hasril dan Norizan menguji penggunaan model STAD melalui kaedah tunjuk cara terhadap peningkatan kemahiran menjahit. Selain itu, *Problem Based Learning* Instruction juga digunakan untuk memastikan pembelajaran berlaku dengan berkesan melalui kajian Estuhono. Tambahan lagi, Hilmi et al. pula membangunkan modul pengajaran berdasarkan model khusus untuk kegunaan guru-guru melatih jurubina bangunan. Manakala Mastura et al. pula menguji kaedah visual bagi pembelajaran mata pelajaran struktur data.

Bagi memastikan keberkesanan pengajaran dan pembelajaran, persepsi pelajar juga penting bagi mewujudkan suasana yang kondusif untuk pembelajaran berkesan. Oleh itu, Azizah et al. mengkaji tentang persepsi pelajar terhadap pembelajaran berasaskan projek. Manakala Arihasnida et al. pula mendalami pelaksanaan konsep pendidikan inklusif di peringkat sekolah menengah. Sementara itu, Jannah et al. menjalankan kajian tentang amalan keselamatan semasa pengajaran dan pembelajaran dalam bengkel, khususnya bengkel katering. Kajian ini juga penting bagi menunjukkan bahawa keselamatan pelajar juga merupakan aspek yang perlu dititikberatkan dalam sesi pengajaran dan pembelajaran selain keberkesanan pembelajaran pelajar.

Editor
Alias Masek

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BAB 5

DESIGNING LEARNING TOOLS BY USING PROBLEM BASED INSTRUCTION (PBI) MODEL ON ENERGY RESOURCE MATERIAL INTEGRATED TO ENERGY SAVING CHARACTER

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Abstract

The purpose of this research is to design science learning Tool by using PBI Model on energy sources material integrated to energy saving character. The research was designed by using Research and Development method. The Learning materials were developed using 4-D model consisting of 4 stages: Define, Design, Develop and Disseminate. However, this research is still at the Design stage. In the Define stage, curriculum analysis is performed, analysis of student characteristics and analysis of science materials. Stage Design designed science learning device based on the Model of Integrated Character Education PBI. The results of the Define stage study were obtaining Competency Standard in this research are "Understanding the various forms of energy and how to use them in everyday life". The results of the research at the Design stage obtained syllabus, lesson plan, module, worksheet, assessment designed following the steps of PBI model integrated energy-saving character

Keywords : *Design, Learning Tool, Science, PBI, Character*

1.0 Introduction

Organizing character education is one thing that is done in every level of education, especially in elementary education level. This is very reasonable because basic education is the main foundation for young people's growth. Reference [5] explains that "Character education is interpreted as an education that develops students' character values so that they have values and character as their own character, apply those values in their life, as members of society, and religious citizens, nationalist, productive and creative". This shows that the students' character values can be nurtured through a continuous and integrated education process.

The values of character education obtained by the students from the result of integrating the value into the learning process that is implemented for all subjects. This means that, in a learning process, besides targeting students to master a particular learning material, students also should recognize, realize and internalize the values of character education through the integration of the character's values in each subject.

Natural Science as one of the subjects taught in elementary schools of course can also be used as a means of implementing the values of character education. Natural science is a subject that explains various physical phenomena that occur in nature, both theoretically and mathematically. This clearly indicates that there are spaces that can be used as a means in developing the values of character education to students in science learning.

Based on the results of discussions and interviews conducted by researchers at the time of carrying out Community Service Activities on the integration of character education together with elementary school teachers in Dharmasraya Regency on January 23, 2017, it was obtained that, the primary school learning has not integrated the values of education character in the learning process and the development of learning tools. The learning process that has occurred so far has not linked to the learning materials with the character education values. This is suspected because the development of learning tools conducted by teachers so far also still not integrate the values of character education.

The achievement of science learning objectives is determined by the learning tools used by teachers. In general, the learning tools used in science teaching in elementary schools are quite diverse. However, some components of learning devices used still need to be fixed. The learning tools that must be improved include syllabus, Lesson Plan, module, Student Worksheet and assessment. The syllabus used has not specific yet and does not accordance with the characteristics of students. This can be seen from the indicators of achievement competence and learning activities contained in the syllabus. Beside that, the lesson plan used by teachers also needs to be improved. Lesson plan actually already have guided by [8], but there are some components of lesson plan that have not complete. The fundamental thing that needs to be improved is the lesson steps integrated to the character values especially the energy-saving character. Furthermore, the science materials cannot accommodate the character values with the characteristics of students. Other learning tools that should be improved are the Students' Worksheet. Meanwhile, in terms of assessments used by teachers, it appears that the indicators of student competence do not appropriate with the assessment used by teachers. Based on the analysis of all learning devices used by teachers, the material has not integrated to the character values, especially energy-saving characters.

One of the strategic efforts that can be done to overcome the problems above is by developing science learning device that integrates the character values in accordance with the characteristics of students. Science learning tools that will be developed consist of syllabus, lesson plan, teaching materials, worksheet, and assessment. Meanwhile, teaching materials will be developed in form of learning modules that are expected to facilitate students in learning anytime and anywhere. The development of integrated science learning tools to character values follows the steps of Problem Based Instruction (PBI) model. This model is effective because the PBI model is a constructivist-

based learning model that accommodates students' involvement in authentic learning and problem solving. Through the application of the PBI model into the learning tools, it enables students to learn actively and fun. So that, it is expected to grow a positive character, especially energy-saving characters for students.

Some efforts to develop PBI-based learning tools have been done before, such as research conducted by [4] which concluded that the development of high-school physics learning devices based on character education with PBI model can improve students' character behavior such as honest character, hard work, discipline, curiosity know, religious, critical thinking, and cooperation. Reference [4] developed learning tools not for science subjects in elementary school but for physics subjects at high school level. Furthermore, research conducted by [1] which concluded that the development of inquiry-based physics-based learning tools integrated character education is able to foster the values of students' character. However, learning tools are also developed for high school physics while the model used is a guided inquiry model. Based on this description, it is necessary to do research on the development of science learning tools based on PBI Model on Integrated Energy Sources Energy Saving Resources.

2.0 Methodology

The type of research used in this research is research development (Research and Development). In developing learning tools based on PBI Model on Integrated Energy Source Materials Character of Save Energy, this study uses 4-D model consisting of 4 stages: define, design, develop, disseminate. However, this study only reached the design stage. In the define stage, curriculum analysis is done, analysis students' characteristics and analysis science materials for elementary school. Design stage is done by designing learning device Integrated to Energy Sources Energy Saving Materials.

3.0 Result and Discussion

3.1 Definition Stage (define)

The defining stage is the first stage in the development of learning tools with the aims to define the requirements of learning by analyzing the learning objectives of the materials developed learning tools. In this defining phase, curriculum analysis is done, analysis of student characteristics and analysis of science materials.

(a) Curriculum Analysis

Reference [6] shows, the development of curriculum is accordance with the principles of development such as student-centered and environmental interests, diverse and integrated, relevant to the needs of life. At the stage of curriculum analysis, the Competency Standards and Basic Competence analysis are devoted to Alternative Source Energy materials. In line with the standard content of science subjects at the Elementary School level, the Competency Standards in this study are "Understanding the various forms of energy and how they are used in everyday life" consisting of two Basic Competencies namely "Explaining the various alternative energies and ways of using them" and "Making a work / model to show changes in motion of energy due to air influences, eg rocket from paper / propeller / paper plane and parachute ". This material will be studied by students with 12 hours time allocation. Therefore, to achieve the indicators that have been established then prepared RPP for 3 meetings.

Based on the two basic competencies above are compiled several indicators of learning. The explanation of Competency Standards, Basic Competence, and Indicator of alternative energy source materials is useful in constructing learning tools. Indicators are used to formulate learning objectives at each meeting where in one indicator can be used to achieve one or more learning objectives. The indicators are formulated as follow:

1. Find information about various alternative energy which are integrated to character values
2. Mention different kinds of alternative energy that are integrated to character values
3. Explain how to use alternative energy types that are integrated to character values

Reference [8] shows on the standard process established by the government for the first educational unit includes the planning of learning process, the implementation of the learning process, assessment of learning outcomes, and supervision of the learning process. Planning the learning process includes the Syllabus and Lesson Plan. The facts in the field indicate that most of teachers are poorly prepared in planning as for example in making Lesson Plan for each meeting. The Lesson Plan used usually still uses pre-existing and has not developed innovative Lesson Plan and integrate character values especially energy-saving characters.

Lesson plan includes activities in the learning process. Implementation of learning requires the inculcation of positive character of students, especially energy saving character in supporting the achievement of one of the principles of learning objectives, especially affective aspects. Based on field observation, each teaching implementation tends to be centered on the teacher (teacher centered) so it tends to give less opportunity to the students to develop their thinking creativity. Students are also less interactive in the learning process because the strategies used by teachers have not provided a vehicle to create a learning climate that accommodates character development, especially energy-saving characters in students.

Analysis of assessment tools shows that teacher still prioritize cognitive aspects. Affective aspects / characters and psychomotor cannot be found in the assessment process in the classroom.

(b) Material Analysis

Material analysis is important before the development of the tool because it is used as a basis in knowing the relevant materials with the curriculum demands so that it can be used to synergize the learning model suitable to achieve the learning objectives. Material analysis also provides an overview of the models and approaches that are effectively used in achieving the expected goals. Material analysis is the identification of the main materials that will be taught and arranged systematically in order to find relevance concepts into everyday life reality. This analysis is aimed to identify, detail, and systematically prepare the key principles of energy source materials by integrating the inner energy-saving character.

Material analysis of alternative energy sources is divided into four, namely solar energy sources, wind energy sources, water energy sources, and geothermal energy sources. The author develops one of these alternative energy sources, the alternative source of solar energy, because the sun is a source of energy for all living things and is a renewable energy source. Solar energy is the only alternative energy that can be directly converted into electrical energy by using solar cells as a tool to change it.

Broadly speaking, the materials in alternative energy sources that will be integrated with energy-saving characters can be seen in the concept map contained in Figure 1.

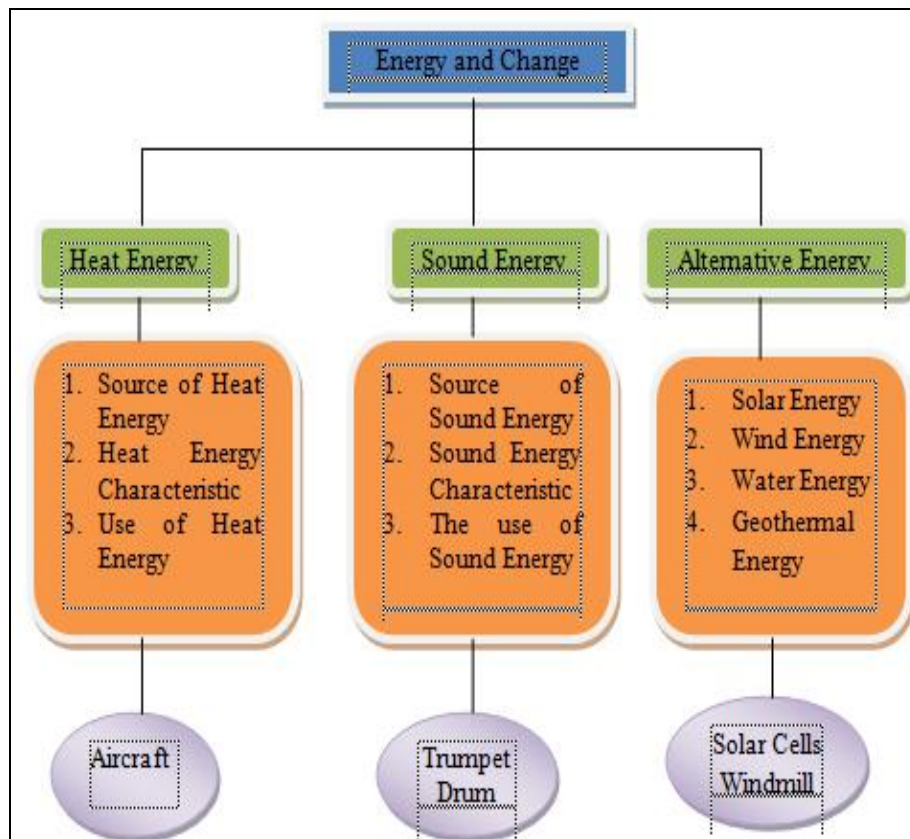


Figure 1 : Concept Map

Based on the analysis of the material conducted, it can be seen the general description of the appropriate learning tools for energy source materials and simple works as well as the syllabus, lesson plan, module, worksheet and assessment used in the learning. Learning tool of alternative energy source is a set of teaching materials that can be used by students in studying alternative energy source materials in growing energy-saving character in students and assisting teachers in implementing learning alternative energy sources. Worksheet is used as a guide to find the concepts studied, while the assessment is used to determine the students' competence.

(c) Analysis of Students' Characteristics

Analysis of the students' characteristics is a study of the characteristics in accordance with the design of development of science learning tools on Energy Sources material Integrated Energy Saving Character. Analysis of student characteristics is a study of the characteristics of students related to alternative energy sources. This analysis is done to get a description of the characteristics of students, among others: (1) the level of ability or intellectual development, (2) the background of experience, (3) cognitive development, (4) learning motivation, (5) as well as skills possessed participants educated, this stage is done to obtain information about the actual conditions that occur in the field. The main problem faced by students is the absence of integration of energy-saving character in the learning process that is on science subjects of alternative energy source material, so that impact on the development of energy-saving character in student self. Based on the analysis found it can be a foundation to develop learning tools in accordance with the needs of students on the material of alternative energy sources is the Development of Science Learning Tools based PBI Model On the Material Integrated Energy Sources Energy Saving Character.

3.2 Design Stage

The design stage is the second stage in device development. Based on the results of the design obtained model of learning Problem Based Instruction (PBI). The PBI model is a model of learning that centers on problem-solving skills through the development of broad-minded creativity in order to apply learned concepts to solve everyday phenomena. This is highly relevant to the concept of the Problem Based Instruction (PBI), the PBI Model which is a constructivist-based learning model that accommodates students' involvement in authentic learning and problem solving. Through the application of the PBI model into the learning tools that are enabled to enable students to learn actively, fun so it is expected to grow a positive character, especially energy-saving characters in students. The result of design of learning device that is produced include syllabus, Lesson Plan, module, Worksheet, assessment based on Problem Based Instruction (PBI) based learning model integrated with character value in alternative energy source material in order to grow energy saving character in student self.

4.0 Conclusion

Based on the research that has been done can be concluded several important points as follows:

1. Based on the curriculum analysis it can be seen that the material of the energy source covered by the Basic Competence "Explains the various alternative energies and how to use them" and "Making a work / model to show changes in motion energy due to air influences, eg rocket from paper / paper plane and parachute ". has an effective relevance to explain alternative energy sources in order to shape energy-saving characters in the upcoming masses.
2. Based on the analysis of student characteristics, the integration model has an opportunity to develop students' character values in problem solving as well as the opportunity to grow energy-saving character for students.
3. Based on the analysis of the material, it can be found general description of the appropriate learning model used in studying energy sources and know the form of effective learning tools to be developed by integrating the character values especially energy saving characters.
4. The results of the design stage obtained a model Instructional strategy used is a model of Problem Based Instruction (PBI) learning that is integrated with the values of the character. Therefore, this study produces learning tools in the form of syllabus, Lesson Plan, module, Worksheet, and assessment-based Problem Based Instruction (PBI) model.

5.0 Acknowledgements

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