

THE IMPLEMENTATION OF LEARNING DEVICES WITH SCIENTIFIC APPROACH TO IMPROVE STUDENT LIFE SKILLS

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ABSTRACT

The purpose of this study was to test the effectiveness of the implementation of learning device with scientific approach to improve student life skills. The research uses one group pre test–post test design. Subjects in this study were students of grade ten (class X). Implementation of learning device supports effectively in learning activities if the implementation of a lesson plan by teachers, student social skills and student academic skills at least in a good category. The results showed that the implementation of lesson plan by teachers to get the average value of 3.38 are in the very good category, gain value of the student social skill at average value of 3.03 is in the very good category, and gain of student academic skill at average value of 76 is in the good category. It concludes that the implementation of learning tools with scientific approach support effectively in learning activities.

ABSTRAK

Tujuan penelitian ini adalah menguji efektivitas implementasi perangkat pembelajaran fisika dengan pendekatan saintifik untuk meningkatkan kecakapan hidup siswa. Penelitian ini menggunakan one group pretest-posttest design. Subjek dalam penelitian ini adalah siswa kelas X. Hasil penelitian menunjukkan bahwa pelaksanaan dari Rencana Pelaksanaan Pembelajaran oleh guru memperoleh nilai rata-rata sebesar 3,38 dan berada pada kategori sangat baik. Kecakapan sosial siswa memperoleh nilai rata-rata sebesar 3,03 dan berada pada kategori sangat baik. Adapun kecakapan akademik siswa memperoleh nilai rata-rata sebesar 76 yang berada pada kategori baik. Berdasarkan hasil-hasil penelitian tersebut dapat diimpulkan bahwa implementasi perangkat pembelajaran dengan pendekatan saintifik efektif menunjang kegiatan pembelajaran fisika dalam meningkatkan kecakapan hidup siswa.

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INTRODUCTION

Preparation of learning tools is something that must be done by teachers in planning learning activities so that the expected goal can be achieved. According to Ibrahim's theory (2003), a component of the learning device to be prepared by teachers to manage the classroom well is the syllabus, lesson plan, student textbook, student worksheet, learning tools, and final examination. Trianto (2008) and Tim Pustaka Yustisia (2008), write that the syl-

labus is a lesson plan on a particular subject that includes a standard competence, basic competence, subject matter or teaching materials, learning activities, indicators of achievement of competencies, assessment, allocation of time and sources of learning. Lesson plan is a plan for teachers which describes the procedures and organizing the implementation of the learning process to achieve a basic competency that has been defined in the standard content and described in the form of syllabus. Student textbook is a guidebook for students in learning activities containing lesson material, concept-based inquiry activities, experimen-

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tal activities, information, and examples of the application of concepts in everyday life. Student worksheet is a guideline of student work to facilitate students in the implementation of learning activities. Learning tools is a messenger from several sources to the recipient of the message. Final examination is a test item used to determine the student learning outcomes after following the learning activities. In this research, the learning device with scientific approach consisting of syllabus, lesson plans, Student textbook, student worksheet, learning tools and final examination developed with attention to student learning experience that will be gained through the learning process to observe, ask, gather information, associates, and communicate.

The syllabus and lesson plan developed in this study use the 5E learning cycle model (Engage, Explore, Explain, Elaborate, and Evaluate). Scientifically-based student worksheet have components such as experimental titles, purpose of the study, tools and materials, problem formulation, hypotheses, variables, operational definitions of variables, experimental steps, observation data, data analysis, and conclusions. The medium used is a three-dimensional media to assist students in completing the tasks contained in the worksheet. During the learning process with the 5E learning cycle model, teacher makes assessment using observation sheet to the observation skills of the social attitudes of students (social skills). Final examination in the cognitive domain (academic skills) is done after the learning process is complete.

In making learning activities, teachers will define models, approaches, strategies, methods, and techniques of learning what will be used in the implementation of learning. According to Suprihatiningrum's theory (2013), learning model is a design which illustrates a learning process that can be done by teachers in transferring knowledge and values to students. Approach is a common way of looking at the problem or object of study, such as learning. The term learning strategies are used to indicate the overall strategy or activities done by teachers to create learning atmosphere is very conducive to the achievement of educational goals. Learning strategy can be said to be implementation of the learning model. Methods are the ways teachers use to teach students. If a strategy refers to a plan for achieving something, then the method refers to a way that can be used to execute the strategy. The

instructional technique refers to the distinctive variety of the application of a method according to the specific implementation background, such as the teacher's ability and habits, the availability of equipment, the readiness of the students, and so on.

Jufri (2010) states that there are some things that must be considered by teachers in choosing or determining the models, approaches, strategies, methods, and learning techniques to be applied. Things to consider are the learning objectives, activities and initial knowledge of the students, the nature of the learning materials, the allocation of time, the supporting facilities, the number of students, the experience and the authority of the teacher.

In developing learning tools, teachers can use a scientific approach that is expected to provide a learning experience for students so that students' life skills increase. Sani (2014) argues that the scientific approach is closely related to the scientific method. Scientific (scientific) methods generally involve observation or observation activities required for the formulation of hypotheses or collecting data. The scientific method is generally based on the exposure data obtained through research or experiments.

Indonesian Ministry of Education And Culture (2013) mentions that, the scientific approach in learning includes: observing, asking, reasoning, trying, forming networks for all subjects. Learning process with scientific approach touching three domains, namely: attitude, knowledge, and skills, so that the learning outcomes produce students who are productive, creative, innovative, and affective. In other words, the application of scientific approaches to learning, including learning of physics, can improve students' life skills. Machin's research (2014) concludes that the scientific approach brings positive effect on the cognitive learning, affective and psychomotor and have reached the classical completeness set.

Mugambi & Muthui (2013) argue that the life skills curriculum plays a major role in enabling students to use their knowledge, attitudes and values into abilities on what to do and how to do it. This study found several factors that influence the implementation of Life Skills curriculum, namely: teaching approach, lack of life skills conceptualization, limited human resources, lack of supervision, teacher preparation is lacking, lack of choice of teaching and learning strategies, limited use of learning resources, bad assessment, and the students'

negative attitudes toward life skills. Mugambi & Muthui concluded that the implementation of Life Skills Education depends primarily on the competence of teachers, on the other hand, are also influenced by extrinsic factors.

Agustina and Saputra (2012) said that the implementation of life skills-based learning can be done by integrating aspects of Life Skills on subjects in secondary schools, one of them is physics. The problems that arise in the implementation of Life Skills based learning are how to design life skills based learning tools, how to develop life skills based learning activities and how to understand the life skills aspects in each subject and difficulties in integrating every aspects of Life Skills in each subject matter in accordance with the available format.

Life skills-oriented education program through a broad-based approach, or known as the *Broad Base Education* is very possible to be implemented in every type and level of education. In addition to not changing the existing curriculum system, this program does not add to the burden of new subjects, but only change the orientation of the learning program (BBE Team of Ministry of Education, 2012).

Ibnu (2014) argues that the application of a scientific approach in the effort to develop the life skills of students through learning in schools still faces various obstacles, among others are the curriculum targets to pursue material adequacy facing examination (national examination) and policies of educational authorities that are less precise, and public perceptions about the success of education has also been wrong. Parents were more likely to appreciate and be proud of ourselves if their son honored ranks in the classroom, school and even its society rather than to the skills their children to practice the *scientific approach* and *process skills*. It educates children if necessary to take shortcuts to achieve mastery of teaching materials without good learning process.

Development of Life Skills (life skills), especially social skills (skill) and academic skill, in this research is facilitated by the use of student worksheet and learning tools in the form of three dimensional media. Trianto (2008) defines that student worksheet is a student guide that is used to conduct the investigation and problem solving. Sukiman (2012) argues that learning media is anything that can be used to channel the message from the sender to the recipient so as to stimulate the thoughts, feelings, concerns, and interests and willingness of students in such a way that the learning process

occurs in order to achieve the learning objectives effectively. Sudjana & Rivai (2013) states that there are four types of learning media, namely: (1) two-dimensional media or graphic media is a medium that has a length and width such as pictures, photographs, graphs, charts or diagrams, posters, cartoons, comics, and etc. (2) three-dimensional media that is in the form of models such as solid model, cross-section model, stacking model, work model, mock-ups, dioramas, and others. (3) projection media such as slides, film strips, films, use of OHP and others. (4) the environment.

Three-dimensional media as one type of learning media can be a model, that is three-dimensional copy of some real objects that are too big, too far, too small, too expensive, too rare, or too complicated to be brought into the class and studied by students in the form its original (Sudjana & Rivai, 2013). Sudjana & Rivai disclose the benefits of three-dimensional media in the learning process, including physics learning in secondary schools are: First, learning will attract more students so it can foster motivation to learn; Second, teaching materials will be more clear meaning so that it can be more easily understood by students and enable students to master the learning objectives better; Third, teaching methods will become more varied, not merely verbal communication through the words of the words by the teacher, so that students are not bored and the teacher does not run out of energy, especially when the teacher teaches for every lesson; Fourth, students do more learning activities, because not only listen to the teacher's description, but also other activities such as observing, performing, demonstrating, and others.

Three-dimensional media is a potential alternative to increases the quality of teaching physics in high school. A solid model usually shows the outer surface of the object rather than the object and often discards the confusing parts of its main ideas of shape, color, and composition. The cross-sectional model shows how an object is visible, when its surface is lifted to know its inner arrangement. The stacking model consists of several parts of a complete object, or at least an important part of the object. The work model is an imitation of an object that shows the outside of the original object, and has some portion of the real thing. Mock-ups are a simplification of the underlying arrangement of a process or a more intricate system. Diorama is a mini-three-dimensional landscape aimed at describing the true land-

scape. Three-dimensional media that has been developed in this research is three dimensional media "Dynamic Electricity".

According to the World Health Organization (WHO), Life Skills (life skills) is the ability for adaptive behavior, and positive that allows students to deal effectively with the demands and challenges of everyday life. According to the United Nations International Children 's Emergency Fund (UNICEF), Life Skills is a behavioral change or behavioral development approach designed to address the balance of three areas of knowledge, attitude and skills. In other words, life skills are the skills needed to live successful (Khera and Khosla, 2012).

Anwar (2006) and Susiwi (2007) revealed that life skills consist of general life skills (General life skills) and life skills that are specific (Specific life skills). Life skills that are general in nature consist of personal and social skills, while life skills that are specific consist of academic and vocational skills. Personal skills (*personal skills*) consisting of: self-knowledge skills (*self-awareness skills*), and thinking skills (*thinking skills*). Social skills (social skills) comprising: communication skills, and ability to cooperate (*collaboration skills*). Academic skills are also called intellectual skills or scientific thinking skills and are the development of thinking skills. Academic skills have already led to academic or scholarly activities. This skill is important for people who pursue a job that emphasizes thinking skills. Therefore, this skill should get emphasis from the beginning of junior high school and especially on the academic program at the university. Vocational skills are also called vocational skills, these skills are associated with certain occupations in the community. This skill is more suitable for students who will pursue jobs that rely more on psychomotor skills. So this skill is more suitable for Vocational High School students, skill courses or diploma programs. This study aims to test the effectiveness of the implementation of the learning device physics with a scientific approach to increase life skills of students in high school.

METHOD

The type of research is research development. The learning device which is developed consists of Syllabus, Lesson Plans, Subject Matter Books, Student Worksheet, Three Dimensional Media, and Learning Result Test are integrated with life skills. Learning device

development model used is Four D model (Define, Design, Develop, Disseminate). According to Ibrahim (2003) and Trianto (2008), this model was adapted into model 4 P (Definition, Design, Development, Deployment).

Define phase aims to establish and define the requirements needed in learning based on a needs analysis, analysis of student, task analysis, concept analysis, formulation of learning objectives. *Design* phase aims to design *prototype* learning device to do the preparation of lesson plan, the selection of student textbook and student worksheet format, visual three-dimensional model, and final test. *Develop* phase aims to produce learning tools which have been revised based on feedback from the validator. *Disseminate* phase aimed at implementation of the learning tools in the classroom. Phase *Define*, *Design*, and *Development* conducted in the first year.

Test of the effectiveness of the implementation of learning tools in the research (second year) conducted in stages Spread (Disseminate), with the subjek were students of grade ten (Class X) 2nd Semester of Academic Year 2015/2016 in Madrasah Aliyah Dakwah Islamiyah Puteri Nurul Hakim Kediri, West Lombok. Research design to test the effectiveness of learning device implementation using One Group Pre-Post test design. According to Arikunto's theory (2006), this design only uses one group only without any comparison group. This design has the disadvantage in terms of testing the effect of independent variables (scientific approach) on the dependent variable (life skills), because it does not use a control group. Therefore, in this study performed a sensitivity analysis items are obtained by the students of the initial test and final test. According to Grounlund (1985) in Ibrahim (2005), the sensitivity index has values from 0 to 1. The value 0 means insensitive, while 1 is very sensitive.

Based on Ibrahim's theory (2005), the sensitivity of a test is the test's ability to measure the learning effect. Question which has sensitivity means the matter can provide information that the measurement result is a result of learning.

Implementation of the learning device with a scientific approach and 5E learning cycle model is said to be effective in this physics study if the implementation of lesson plans by teachers, students' social skills and academic skills of students at least have the good category. Here are the phases of learning with

5E learning cycle model to provide student learning experiences appropriate scientific approaches such as observing, asking, gathering information, associating, and communicating.

Table 1. Learning Cycle Model 5E.

Phase	Teacher activity
Engage	Conditioning the students to be ready to follow the lessons by giving demonstrations or questions to determine the ability of the beginning
	Presenting indicators (learning objectives)
Explore	Dividing the students in groups
	Guiding students to work on student worksheet
Explain	Providing an opportunity for group representatives to present their work based on student worksheet
	Explaining or straighten the concept of learning material based on data from student experiments
	Directing student's experiment results to answer problems in preliminary activities
Elaborate	Encouraging students to inquire material that remains poorly understood by asking teachers
	Demonstrating application of concept about learning material in everyday life
	Checking students' understanding of learning materials by asking them back
Evaluate	Guiding students to make conclusions
	Providing follow-up to give the assignment or homework

Implementation of learning with scientific approach and 5E cycle learning model for Dynamic Electrical material conducted during 6 times meeting. The time allocation for each meeting is 2 hours of lesson.

RESULTS AND DISCUSSION

Some obstacles / problems can occur in the implementation of learning activities in the classroom, including in physics learning. Akinbobola & Afolabi (2010) mention that the challenge in teaching physics is to create ex-

periences that engage students and how to facilitate students in order to have the skills like observing, measuring, classifying, communicating, concluding, using numbers, using the relationship of space / time, asking questions, controlling and manipulating variables, creating hypotheses, making the operational definition of variables, model making, designing experiments, and interpreting data. According to Oladejo, et.al. (2011), the strategies used by teachers is one of the factors that influence academic achievement that is still lacking in physics lesson.

Implementation of the learning device physics with a scientific approach conducted in six sessions, with the stages of each meeting is to observe, inquire, try (experiment), associate (reasoning), communicate. Learning with a scientific approach is a student-based learning activity. According Bonwell & Eison (1991) in Prince (2004), active learning is a teaching method that engages students in the learning process. In short, active learning requires students to do meaningful learning activities and think about what they do.

The results of observation on the implementation of Lesson Plan (RPP) by teacher are as follows.

Table 2. Implementation of lesson plan by teacher.

Meeting	Score	Criteria
1st	3.58	Very good
2nd	3.50	Very good
3rd	3.42	Very good
4th	3.42	Very good
5th	3.17	Very good
6th	3.17	Very good

The mean adherence to the lesson plan by teacher of 3.38 are in the very good category. This is because the teacher has implemented the learning in accordance with the planning contained in the learning tool with a scientific approach. Stages of learning using a scientific approach have provided a learning experience for students so that students can develop life skills. This is in accordance with regulation of the Indonesian ministry of education No.81A In 2013, Appendix IV, that there is a link between the pace of learning with learning activities and their meanings, as follows.

Observe

Learning activities undertaken in the

process of observing are: reading, listening, listening, seeing (without or with tools). The developed competencies are: training in sincerity, thoroughness, seeking information.

Ask

Questioning learning activities are conducted by asking questions about information that is not understood from what is observed or questions to get additional information about what is observed (starting from factual questions to hypothetical questions). The competencies developed is to develop creativity, curiosity, the ability to formulate questions to establish the critical thinking necessary for intelligent life and lifelong learning.

Gathering information / Experiments (Trying)

Gathering information / experiments on learning activities include: conducting experiments, reading sources other than textbooks, clicking observe objects / events / activities, and interviews with sources.

Competencies developed in the process of gathering information / experiments are developing a meticulous, honest, courteous attitude, respecting the opinions of others, communication skills, applying information gathering skills through various ways learned, developing lifelong learning and learning habits.

Associate / Process information

Learning activities undertaken in the process of associating / processing information are as follows. First, process the information that has been collected either limited from the results of collecting activities / experiments as well as the results of observing activities and information gathering activities. Second, creating information collected from nature to add breadth and depth to the information processing that are looking for solutions from a variety of sources that have a different opinion to the contrary.

Competencies developed in the process of associating / managing information are Developing honest, meticulous, disciplined, obedient, hard work, ability to apply procedures and inductive and deductive thinking skills in concluding.

Communicating

Communicative learning activities are to deliver results of observations, conclusions based on the results of analysis orally, writ-

ten, or other media. Competents developed in communicating stages are developing honest, meticulous, tolerant, systematic thinking skills, expressing opinions briefly and clearly, and developing good and correct language skills.

The observation of students' social skills during the learning process with the scientific approach are as follows.

Table 3. Student social skills.

Meeting	Score
1st	2.35
2nd	2.78
3rd	3.00
4th	3.38
5th	3.22
6th	3.46
Average	3.03

The average of students' social skill of 3.03 is in very good category. This is because students are facilitated by the student's worksheet and the media of three-dimensional dynamic electricity. Students' social skills were observed during the learning with the scientific approach is the ability to communicate and cooperative skills. According to the Ministry of Education's theory (2002) as cited by Susiwi (2007), communication means communicate not just deliver the message, but communications with empathy. Empathy, understanding attitudes, and the art of two-way communication need to be developed in the communication skills so that the contents of the message up and accompanied by a good impression that can foster harmonious relationships. Communicating can be through oral or written. For oral communication, the ability to listen and convey ideas orally should be developed. Communicating oral with empathy means the ability to choose words and phrases that are easy to understand by the other person. This skill is very important and needs to be grown in education. Communicating through writing is also a very important thing and has become a necessity of life. Skill pouring ideas through writing that is easily understood by others, is one example of the communication skills of writing. Further, he said that as social beings, in everyday life people will always need and cooperate with other human beings. Cooperative skills are not just "working together" but cooperation is accompanied by mutual understanding, mutual respect, and mutual help. Susiwi (2007) states

that cooperative skills can be developed in all subjects, for example, work on group assignments, field trips, and other forms of activity.

The learning outcomes of the cognitive domain as an indicator of students' academic skills are as follows.

Table 4. Academic student skills.

Student ID	Score	Completeness
1	92	Complete
2	72	Complete
3	72	Complete
4	76	Complete
5	64	Incomplete
6	84	Complete
7	92	Complete
8	76	Complete
9	68	Complete
10	88	Complete
11	88	Complete
12	64	Incomplete
13	88	Complete
14	68	Complete
15	88	Complete
16	80	Complete
17	88	Complete
18	64	Incomplete
19	76	Complete
20	64	Incomplete
21	92	Complete
22	68	Complete
23	64	Incomplete
24	72	Complete
25	68	Complete
26	72	Complete
27	68	Complete
Average	76	Complete

The average student's academic of 76 with classical completeness as much as 81%. Implementation of the learning device with a scientific approach to develop a student's academic skills include skills: identifying variables, explaining the relationship variables, formulating hypotheses, designing and conducting experiments.

CONCLUSION

The observation of lesson plan with a scientific approach by teachers earn an average value of 3.38 are in the very good category, students' social skills amounted to 3.03 are in the very good category, students acquire the academic skills average of 76 are in good category. Thus, it can be concluded that the implementation of learning tools with scientific approach is effective to support the learning activities in physics.

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REFERENCES

- Agustina, P. and Saputra, A. (2012). Learning Implementation Problems of Life Skills-Based Biology (*Life Skills*) in Indonesia. *Proceeding National Seminar IX*. Surakarta: Biology Education FKIP University of Sebelas Maret (UNS).
- Akinbobola, AO & Afolabi, F. (2010). Constructivist practices through guided discovery approach: The effect on students' cognitive achievement in Nigerian senior secondary school physics. *Eurasian Journal of Physics and Chemistry Education*. 2 (1): 16-25.
- Anwar. (2006). *Life Skills Education: Concepts and Applications*. Bandung: Alfabeta.
- Arikunto, Suharsimi. (2006). *Research Procedure: A Practice Approach*. Jakarta: Rineka Cipta.
- Ibnu, S. (2014). Implementation of Curriculum 2013 In Science Lesson. *Proceedings of the National Seminar: Research, Science Learning, and Curriculum 2013*. Implementation Mataram: PPS Science Education Master program Mataram University.
- Ibrahim, Muslimin. (2003). *Learning Device Development*. Jakarta: Dirjen Dikdasmen Depdiknas.
- Ibrahim, Muslimin. (2005). *Sustainable Assessment: Basic Concepts, Stages of Development and Examples*. Surabaya: Unesa University Press.
- Jufri, A. Wahab. (2010). *Learning and Learning Science*. West Lombok: Arga Puji Press.

- Kemendikbud. (2013). *Teacher Training Content: Implementation of Curriculum 2013*. Jakarta: Kemendikbud.
- Khera, S. & Khosla, S. (2012). A Study Of Core Life Skills Of Adolescents In Relation To Their Self Concept Developed Through Yuva School Life Skills Program. *International Journal of Social Science and Interdisciplinary Research*, Vol.1 Issue 11.
- Machin, A. (2014). Implementation of Scientific Approach, Planting Character and Conservation Learning Materials On Growth . *Indonesian Journal of Science Education*, 3 (1), 28-35.
- Mugambi, MM & Muthui, RK (2013) . Structural Influence Of Context On Implementation Of Secondary School Life Skills Curriculum In Kajiado County, Kenya. *International Journal of Education and Research*, Vol. 1 No. 3.
- Oladejo, MA, Olosunde, GR , Ojebisi, AO, Isola, OM (2011). Instructional Materials and Students' Academic Achievement in Physics: Some Policy Implications. *European Journal of Humanities and Social Sciences*, Vol. 2, 1.
- Rules Minister of Education and Culture of the Republic of Indonesia Number 81A Year 2013 about Curriculum Implementation .
- Prince, M. (2004). Does Active Learning Work? A Review of the Research. *Journal of Engineering Education*, 93 (3), 223-231.
- Sani, Ridwan Abdullah. (2014) . *Scientific Learning to Implement Curriculum 2013*. Jakarta: Earth Literacy.
- Sudjana, N., & Rival, A. (2013) . *Teaching Media (Using and Making)*. Bandung: New Light Algensindo.
- Sukiman. (2012) . *Learning Media Development*. Yogyakarta: Pustaka Insan Madani.
- Suprihatiningrum, Jamil. (2013) . *Learning Strategies: Theory and Applications*. Jogjakarta: Ar-Ruzz Media.
- Susiwi. Life Skills (*Life Skills*). Bandung: UPI 2007.
- BBE team mone. (2012) . *Implementation Patterns of Life Skills Education*. Surabaya: SIC.
- Reader Tim Yustisia. (2008) . *Complete Guide KTSP (KurikulumTingkat Satuan pendidikan)*. Jakarta: Pustaka Yustisia.
- Trianto. (2008) . *Designing Contextual Learning (Contextual Teaching and Learning) in the Class*. Jakarta: Smart Reader.