

Development Of Lesson Plan Instrument On Skleton, Muscles And Simple Machine Topic For Junior High School: The Validity And The Practicality Test

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Abstract: *This research is aimed to evaluate the lesson plan instrument on skeleton, muscles, and simple machine material for junior high school on validity and practicality. The lesson plan instrument covers the syllaby, lesson plan, material, students' workbook, and assessment sheets. The research model used is Tessmer model which covers 1) self-evaluation, 2) expert judgment, 3) individual testing, 4) small group testing, and 5) field testing. The method of the research is quantitative descriptive. The research is held in SMPN 1 KertakHanyar. The subject of the research stands for; individual testing subject involves three students of grade VIII E, small group testing which engages seven students of grade VIII E, field testing subject which are the students of grade VIII F by 21 numbers of students. The determination of research subjects is done purposively, which means the students are divided into high, intermediate, and lower academic competence. The research result shows that the lesson plan instrument is valid and practical. Validity is shown from the validity result of three experts who use some categories; the validity and the legibility of the material and students' workbook by the intermediate student. The lesson plan is practical because the teacher partner is able to hold the teaching and learning activities, and the students also have the good response.*

Keywords: *lesson plan instrument, development research, critical thinking skills.*

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I. Introduction

Natural science is a science that explains theories based on natural phenomena which can be observed and measured. The theory explains the simple natural phenomenon to find the relations among the facts. Science learning has strong relation with concept understanding, inquiry competence, and problem solving skill. Based on the curriculum center, the research and development council national education department (2013) stated that "natural science (IPA) is related to the way to explore nature systematically, therefore natural science is not only the mastery of science compilation in the form of merely facts, concepts, or principles, but also a process of discovering. Natural science learning emphasizes on giving experience directly to develop competencies so that the students can explore and understand their environment naturally. Natural science learning is directed to find out and act so it can help the students to reach deep understanding about nature."

The process of education is also required to prepare and produce qualified human resources which can process information well (Depdiknas, 2013). Therefore, to reach the stated competences hoped by the government, an effort can be done is by making critical thinking skill familiar among students. The intended critical thinking skill is the critical thinking focuses on decision making pattern about things to believe and things to do (Ennis, 1993)

Based on Robbins (2005) the critical thinking skill is a skill that can be taught, so this skill is actually can be learned. In science learning, the students are taught to get the knowledge through data collecting by doing experiment, observing, and communicating, to produce trusted explanation. Ryder (1986) as quoted by Filsaime (2007) stated that a person who has competency to continue developing is a person who believes the importance of critical thinking in every daily activity. Facione (1999) as quoted by Filsaime (2007) explained that critical thinking skill can be learned, measured, and taught. One lesson that can enhance the critical thinking skill is biology, considering the basic competence in science sillaby which requires cognitive part on grade C3 up to C6 (applying, analyzing, evaluating, and creating)

The importance of critical thinking exercise since the early years becomes the main compulsory task for teachers, considering many researches which report that the critical thinking skill in Indonesia is still low. Wasis dkk. (2011) as quoted by Wasis (2015) presented PISA data in 2000-2009, indicating that Indonesian students' critical thinking skill is still low, mainly in implementing science. Bassham (2010) states that science

education is not yet put more orientation in adapting and developing the higher thinking skill (critical thinking), otherwise it still emphasizes on lower cognitive study result. The students are hoped to absorb the information passively and then remember it while sitting the exam.

The result of interview and observation in SMP Negeri 1 Kertak Hanyar with science teacher shows that the teaching and learning process and the evaluation assessment given has not really emphasized on developing the critical thinking skill so that the competence is not trained well. This condition causes students' low performance in critical thinking competence. It is difficult for the students to analyze the information from people or books, students are not active in questioning or answering questions from problems provided by teachers, and it is hard for them to present ideas or opinions to solve problems. Also, the result of academic achievement generally does not reach the expectation yet, proved by the students who can not pass the minimum accomplishment criteria (KKM) in learning process. This is the impact of missing the material which is not critical thinking – oriented. Teachers often use conventional method, so the students only focused on the information from teachers and consider them as the only one source of informatio. So as the material used by teachers especially K13 material and students' workbook obtained by certain publisher.

Based on that condition, efforts are needed to increase students' critical thinking skill. One way that can be done is by developing lesson plan instrument. The process of learning as the infrastructure, while the used lesson plan instrument as the media which brings the students into the infrastructure on training and exercising the critical thinking skill. The lesson lan instrument should be valid and practical.

The guided inquiry model can be used to develop the critical thinking skill. Guided inquiry is the activity suggesting the teacher to support the students to directly deal with the discovering activity. Based on Depdiknas (2006), scientific inquiry can enhance the willingness to think, create, behave scientifically, and communicate well. Therefore, the processing competence and scientific behavior is truly emphasized on learning. The guided inquiry learning model has syntax which covers; formulating problems, presenting hypothesis, collecting data, data testing, and concluding.

The benefits of guided inquiry model are the following; (1) it helps the students to increase the cognitive competence, (2) the students become more independent in understanding the concepts or facts from their own findings, (3) the students becomes more motivated in learning, (4) the students can develop their interests based on their competencies, (5) the teaching and learning process is students-centered and the teacher becomes the facilitator so the students are more confident in learning (Hanafiah and Cucu, 2012).

Toharudin and friends (2011) presented that the science content refers to the key concept to understand the certain natural phenomenon and the changes happened as the impact of human activities. The process of science means the students' competence to use the knowledge and scientific understanding in answering a question and solving problems. In science learning, there are learning materials dealing with the important issues in general life.

The material on skeleton, muscles, and simple machine in grade VIII Junior High School can be learned scientifically using guided inquiry model. The intended basic competence (KD) is that the students are able to describe skeleton structure, human muscles and their function in various conditions, also describing the use of simple machine in daily life and its relation with muscle performance and human skeleton structure. This material contains object of study which deals with critical thinking skill. For instance, every human definitely moves, stands upright, walks, runs, and even lifts burden heavier than their wiehts. This statement can be the object of study used as the source of learning. Teacher can implement the guided inquiry model and asks the students to do experiments and discussions to search the data and information about the taught material.

Broadbear (2003) stated that the experiment activity or practicum which requires the observation of symtoms and phenomena will challenge the students' critical thinking skill. Trautmann (2000) stated that collaborative investigation can enhance students' harder work and stimulate trained critical thinking skill by discussing every assumption and interpretation they have.

The arguments above make the researchers are interested in doing developed lesson plan researc, this development is done so that the students can develop their competencies and increase their study results. Therefore, the researcher name this research by the title "Validity and Practicality of Developed Lesson Plan Instrument on Topic of Skeleton, Muscles, and Simple Machine in Junior High School".

II. Method

The research uses formative evaluation development model by Tesmer. The stages of research 1) self evaluation, 2) expert reviw 3) one to one 4) small group testing and 5) field test. The method of the research is descriptive quantitative. The research is held in SMPN 1 kertak Hanyar. The research subject consists of; one to one subject: three students of grade VIII E, field test subject: 21 students of grade VIII F.

The validity data is obtained from the expert team decision using lesson plan validity assessment and material and students' workbook legibility assessment by the students. The practicality data is from the expert

review about the implementation of teaching and learning process by teacher partner, using lesson plan implementation assessment and the response of students toward the teaching learning process.

III. Result And Discussion

1. Lesson Plan Validity

Lesson plan instrument validity is obtained from 1) expert validity about syllabus, lesson plan, material, students' workbook, assessment and 2) students' opinion about the material and students' workbook. The validity of lesson plan instrument is presented on Table 1.

Table 1. the validity result of lesson plan instrument

| Indicator | Score | Category |
|--|-------|------------|
| Syllaby | | |
| Systematization | 4 | Very Valid |
| KD (basic competence) and KI (core competence) adherence | 4 | Very Valid |
| Material scope | 4 | Very Valid |
| The learning design according to students' potencies | 4 | Very Valid |
| Citing scientific method | 4 | Very Valid |
| Assessment based on KI (core competence), KD (basic competence), main material and learning. | 3 | Valid |
| Indicator and material adherence | 3 | Valid |
| Language usage based on EYD | 4 | Very Valid |
| Simple sentence structure | 4 | Very Valid |
| Time allocation and learning activity adherence | 4 | Very Valid |
| Lesson Plan | | |
| Complete lesson plan components | 4 | Very Valid |
| Motivating, giving apercption and informing lesson direction | 4 | Very Valid |
| Lesson direction supports to think critically | 4 | Very Valid |
| Lesson aim formulation is directed with ABCD aspect | 4 | Very Valid |
| Critical thinking skill integration in lesson plan | 4 | Very Valid |
| Citing introduction, content, and closing activities | 4 | Very Valid |
| Learning stages and lesson direction adherence | 4 | Very Valid |
| Scientific methodcoverance in lesson plan | 4 | Very Valid |
| Learning activity emphasizing on life skill | 3 | Valid |
| Learning activities based on learning experience | 4 | Very Valid |
| Using source of learning from nearest environment | 4 | Very Valid |
| Practical learning media in using | 4 | Very Valid |
| Learning model supports students to think critically | 4 | Very Valid |
| Citing tools and material during the learning | 4 | Very Valid |
| Citing assessment instrument | 4 | Very Valid |
| Citing reference sources in lesson plan | 4 | Very Valid |
| Content | | |
| Relevant material with the competence | 4 | Very Valid |
| Relevant arguments with the development stage | 4 | Very Valid |
| The material is based on knowledge truth | 4 | Very Valid |
| The material is relevant with the latest development | 4 | Very Valid |
| The presented material is relevant with daily life | 4 | Very Valid |
| Supporting students' curiosity | 3 | Valid |
| Supporting students' interaction with the source of learning | 3 | Valid |
| Supporting the students to built their own knowledge | 3 | Valid |
| Material systematization | 4 | Very Valid |
| Sentence structure is relevant with students' understanding stage | 4 | Very Valid |
| Paragraphs are suitable with students' understanding stages | 4 | Very Valid |
| Picture usage supports the material explanation/argument | 4 | Very Valid |
| Picture presented is completed with caption | 4 | Very Valid |
| Precise spelling | 4 | Very Valid |
| Precise term usage | 4 | Very Valid |
| Precise sentence structure arrangement | 4 | Very Valid |
| Students' Workbook (LKPD) | | |
| Students' workbook emphasis on finding concept | 4 | Very Valid |
| Presented case and material adherence | 3 | Very Valid |
| Sequence systematization | 4 | Valid |
| Penggunaan gambar yang menarik dan mendukung materi Using interesting picture which support the material | 4 | Very Valid |
| Language usage based on EYD | 4 | Very Valid |
| Simple sentence structure | 4 | Very Valid |
| Interesting workbooks' appearance | 4 | Very Valid |
| Efficient in time | 4 | Very Valid |
| Efficient in budget | 4 | Very Valid |
| Efficient in energy | | |
| Cognitive Product Assessment | 4 | Very Valid |
| Clear test direction | 4 | Very Valid |
| Clear scoring guidance | 4 | Very Valid |

| Indicator | Score | Category |
|--|-------|------------|
| Critical thinking description in questions | 4 | Very Valid |
| Instrument practicality | | |
| Cognitive Process Assessment | 3 | Valid |
| Suitable assessment category for critical thinking indicator | 3 | Valid |
| Assessment category can measure every students' answer | 3 | Valid |
| Clear indicator category assessment | 4 | Very Valid |
| Citing suitable sources | | |
| Affective Assessment | 4 | Very Valid |
| Measurable description of observed aspect | 3 | Valid |
| Relevant affective aspect for behavior and social skill | 3 | Valid |
| Behavioral skill aspect description of critical thinking | 3 | Valid |
| Observed aspect implementation on effectivity | | |
| Psychomotor Assessment | | |
| Measurable description of observed aspect | 4 | Very Valid |
| Relevant psychomotor aspect for learning activity | 4 | Very Valid |
| Observed psychomotor aspect description on critical thinking | 4 | Very Valid |
| Observed aspect implementation on effectivity | 4 | Very Valid |

Category: 4 = Very Valid, 3 = Valid, 2 = Fair, 1 = Low

Table 1. shows that syllaby, lesson plan, students' workbook, material and assessment sheet are valid. The result of material and students' workbook legibility by students is presented on Table 2.

Tabel 2 Material and Workbook Legibility Result

| Indicator | Students Judgement |
|-------------------------------|--------------------|
| Material | |
| Content | Interesting |
| Appearance | Interesting |
| Font used | Good |
| Font size | Good |
| Language legibility | Good |
| Term and vocabulary selection | Good |
| Term/symbol usage consistency | Good |
| Communicative language usage | Good |
| Effective language usage | Good |
| Abstruse explanation | Nothing |
| LKPD/Workbook | |
| Content | Interesting |
| Appearance | Interesting |
| Font type | Good |
| Font size | Good |
| Language legibility | Good |
| Term/vocabulary selection | Good |
| Term/symbol usage consistency | Good |
| Communicative language usage | Good |
| Effective language usage | Good |
| Abstruse explanation | Nothing |

Based on table 1 and table 2, the research continues on testing practicality which covers lesson plan implementation and studentst' responses.

2. Lesson Plan Practicality

Lesson plan practicality based on its implementation is presented on table 3.

Tabel 3. Lesson Plan Implementation

| No. | Activity | Average score per meeting | | | | | Average | Category |
|-----|---------------|---------------------------|-----|-----|-----|-----|---------|-----------|
| | | 1 | 2 | 3 | 4 | 5 | | |
| 1 | Interoduction | 3,7 | 3,6 | 4,0 | 3,7 | 3,9 | 3,8 | Very good |
| 2 | Content | 3,4 | 3,6 | 3,5 | 3,6 | 3,7 | 3,6 | Very good |
| 3 | Closing | 3,5 | 3,5 | 3,8 | 3,8 | 4 | 3,7 | Very good |

Note : $3 < X \leq 4$ = Very good $1 < X \leq 2$ = Fair
 $2 < X \leq 3$ = Good $X \leq 1$ = Low

Table 3 shows that teacher can implement lesson plan. It states that during the process of teaching and learning with guided inquiry model, teacher can practically implement the lesson plan. Students' response towards the learning is presented on table 4.

Table 4. Students' response towards learning process

| No. | Scoring Aspect | Score (%) | Category |
|-----|---|-----------|----------------|
| 1 | Learning process uses fun lesson plan | 58 | Agreed |
| 2 | Learning process uses lesson plan which can simplify the material | 86 | Agreed |
| 3 | Learning uses motivating lesson plan instrument to think critically | 58 | Totally agreed |
| 4 | The learning process uses lesson plan instrument which simplifies concept relation among skeleton, muscles, and simple machine topic | 58 | Agreed |
| 5 | Learning uses challenging lesson plan instrument | 58 | Totally agreed |
| 6 | The practicum and group discussion with guided inquiry model give chance to think critically | 71 | Totally agreed |
| 7 | Cooperation among partners with guided inquiry model makes students think critically so they can learn towards each other. | 86 | Totally Agreed |
| 8 | Lesson plan instrument with guided inquiry model helps to train critical thinking skill in doing experiment based on problems | 71 | Agreed |
| 9 | Learning process uses lesson plan instrument which supports contributing various ideas so that the critical thinking skill is trained | 58 | Totally agreed |
| 10 | Learning process uses effective lesson plan instrument | 58 | Agreed |

Table 4. shows students' responses towards lesson plan instrument developed by teachers. The teachers is able to conduct the learning process and the students show positive response towards the process of learning.

Based on the research result, below are some inferences:

1. Lesson plan validity
 - a. The sub-indicators of syllaby are mainly very valid. The syllaby consists of education unit, core competence, basic competence, sub-material, learning activity, indicator, assessment, time allocation, and learning source.
 - b. The sub-indicator of lesson plan are mainly very valid. The lesson plan consists of education unit identity, core competence, basic competence, indicator, learning direction, learning material, learning strategy, learning stages, assesment, media, and learning sources.
 - c. The sub-indicator of learning material are very valid. The material contains cover, introduction, table of content, learning process, concept map, title, summary, evaluation test, glossary, and bibliography
 - d. The sub-indicators of workbook are mainly very valid. The workbook contains learning direction, experiment direction, problem formulation, hypothesis formulation, tool and material, experiment procedure, experiment result data, data analysis, conclusion, and
 - e. All sub-indicators of product cognitive assessment are very valid.
 - f. The cognitive process assessment sub-indicators are mainly valid.
 - g. Affective assessment sub-indicators are mainly valid.
 - h. All psychomotor assessment sheet sub-indicators are very valid.
2. Lesson plan instrument practicality
 - a. The teacher conducts the lesson plan very well
 - b. Students' response towards the learning process is very good

IV. Discussion

1. Lesson Plan Instrument Validity

The result of general validity stated that the developed lesson plan istrument is valid and can be used on the next stage to obtain practicality value. This finding is supported by the result of former research (Adams, 2010; Nisa, 2012; Dewi and friends, 2013). The instrument is said to be valid if the assessment result of all validated aspect is in good category. (Nisa, 2012). A lesson plan is valid if its components are suitable with lesson plan validity indicators (Dewi and friends, 2013). Validity is one criteria which determines the quality of a product (Akker, 2006). The assessment instrument should be valid to decrease the fault in measuring process (Taherdoost, 2016).

The developed syllaby has been set according to 2013 curriculum and uses guided inquiry learning model. The syllaby development is fully directed to three fields of development which are attitude, knowledge and skill mastery. It is in line with Akbar's (2013) opinion stated that the syllaby should cover all aspects of competence, not only attitude and knowledge but also skill and those will bring students into good lifeskill.

The developed lesson plan is stated to be valid. Based on Hosnan's explanation (2014) the lesson plan instrument is face-to-face learning activity plan for one meeting or more. Every teacher must arrange lesson plan completely and sistematically so that the learning process will be interactive, inspirative, efficient, and motivating to contribute actively, also giving enough space for creation, creativity, and independency based on talent, interest, and students' physical and psychological development.

The developed material is said to be valid. One requirement to know the feasibility of the material to be used in learning process is by doing validation stage. Based on Trianto (2013) the material should contain chapter outline, scientific words, directions, learning material such as explanation should be learned, tables or pictures as illustration in material, experiment activity, personal test in every sub-main material and problems in daily life.

Students' workbook is arranged to train the critical thinking skill. The workbook contains performance assignment should be done and it also contains learning direction, experiment direction, problem formulation, hypothesis formulation, tool and material, experiment procedure, experiment result data, data analysis, conclusion, and reinforcement test.

Cognitive product assessment and psychomotor assessment is stated very valid, most of cognitive process assessment and affective assessment are stated valid. As explained in study result assessment (Trianto, 2013) that teacher should understand assessment principles such as (1) study result assessment should be designed clearly related to which competence will be assessed, which material will be tested, the easurement tools, and assessment result interpretation, (2) the measurement should be valid.

Lesson plan validity is also stated based on one to one test result towards material and workbook. From one to one test it is obtained that the material and workbook is in good category. Tessmer (1998) stated that one-to-one evaluation on students is very good to be done to identify the faults and problems in the initial prototype of lesson plan. Students can act as the judges to evaluate the initial prototype of lesson plan instrument.

This research has produced valid and practical lesson plan instrument prototype. Nieveen (1999) as quoted by Mafumiko (2006) explained that a prototype is all products designed before obtaining the latest product or it is duplicated and fully conducted in real condition.

2. Lesson Plan Practicality

The lesson plan instrument is practical in use based on 1)the partner teacher is able to conduct the teaching and learning process, and 2)students give positive response towards the learning process. The lesson plan implementation is not depart from teacher's role in managing the learning. Based on Hosnan (2014) that every teacher should arrange lesson plan completely and systematically so the learning process will be interative, inspirative, fun, challenging, efficient, motivating students to participate actively, and giving enough space for initiative, creativity, and independency based on talent, interest, and physical and psychological students' development.

Based on observation result, it is obtained that the teacher is able to conduct most of the learning activity in lesson plan. While the observation result of lesson plan implementation can be seen in table 3. The result observation shows that the teacher is able to conduct the guided inquiry based learning. It is in line with Dewi's (2013) research result which shows that the practicality of the guided inquiry learning describes that the developed lesson plan can be conducted very well by teacher and students. Singh (2016) teacher is the center of attention in classroom learning who really empowers the classroom management. , so the practicality of the learning can be seen from teacher's ability in conducting teaching and learning process. Zohar's (1999) research stated that the inquiry based learning can support the students to increase the critical thinking skill.

Lesson plan practicality is also stated based on positive response of the students towards the learning process. This condition is in line with Anam (2015) who stated that the response should be interpreted as the indication that the learning process runs very well. Hosnan (2014) stated that students good attitude towards the learning process covers learning atmosphere, strategy, methodology, and learning technique which is used to grow students' learning motivation so that optimum result study can be reached.

Based on above presentation, it can be concluded that the guided lesson plan instrument has reached the practicality to be used or implemented on classroom learning or other school.

V. Conclusion

The conducted developed research can answer research aim and problem. From this lesson plan research, the conclusion is obtained that the lesson plan using guided inquiry model is categorise as valid and practical.

1. Developed lesson plan instrument is categorised valid based on the validity result from 3 experts and the legibility test of material and workbookby students.
2. The practical developed lesson plan is categorised very well in implementation from implemented stages of learning using guided inquiry model seen from lesson implementation during the process of learning observed with lesson plan implementation sheet. The students also totally agree with the conducted learning using guided inquiry model.

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