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DEVELOPMENT OF THE GUIDED INQUIRY STUDENT WORKSHEET FOR BIOLOGY GRADE 11th SENIOR HIGH SCHOOL

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Abstract: The purpose of this study is produced Students' Worksheet (LKS) which valid, practice, and effective to support the learning biology materials using a guided inquiry model. The development of worksheets is using ADDIE (analyze, design, develop, implement, and evaluate) models and being implemented in XI Grade senior high of Trensains Tebuireng Jombang on odd semester of 2016/2017 academic year with the One-group pretest-posttest design. The validity of the worksheet is measured from consistency (construct validity) and relevant (content validity aspects) based on expert assessment with a minimum score of 2.60 (Valid). Practicality worksheet is measured from students' activities and Students' activities can be avowed good by minimum 65% of percentage. The effectiveness of the learning device is measured by its impact of the increasing of students' learning result in a pilot implementation or final implementation class as well as student's response. Meanwhile, the learning device can be avowed effective if there are significant improvement scores of students' learning process in knowledge aspect. The responses of students are measured by the percentage of students' responses "Yes" in every aspect of the questionnaire with a minimum score of 61% of percentage. The validity and practicality of the data are analyzed descriptively while the increasing of learning cognitive aspects results are analyzed inferentially by using the paired t-test. Based on the data analysis results can be concluded that the development of learning device are valid, practical, and effective.

Keywords: *learning material, guided inquiry, learning achievement*

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INTRODUCTION

The student knowledge can grow by giving the instruction at class. Instruction is for initiating, facilitating, and increasing the intensity and quality of learning on students (Winataputra, 2007). Instruction is the most important to obtain the student knowledge. Therefore it is needed to develop the instruction material which suits with the subject. The suitable instruction material which is based on Kurikulum 2013. Teacher has a role to design the instruction material. As we know PP nomor 19 Tahun 2005 about process standard that explains teacher is hoped to be able to develop the lesson plan completely and systematically. It aims in order to the instruction will be interactive, imperatives fun, challenging, able to motivate the students to learn actively. It may give space enough to develop the initiative, creativity, independence that suits with talent, interest, and physical and psychology development which is based on the prevail curriculum. In PP nomor 19 tahun 2005 explains which the planning is the instruction material.

The instruction material is one of the preparation which is done by teacher before teaching at class (Daryanto & Dwicahyono, 2014). Based on the meaning of the instruction material that the instruction material has a function as the teacher orientation for teaching the instruction at class. The successful instruction can show the successful teacher to preparation the instruction. The preparation of teaching is prepared well so it will affect the positive matter while the instruction is held. It means that the teaching preparation is developing the instruction material. The instruction material was developed suitably with Kurikulum 2013.

The instruction which is wanted by Kurikulum 2013 is student centered instruction. The student centered instruction wants the student learn actively at class. If the student is active at class, it will increase the competency of cognitive, affective, and psychomotor. According to Kurikulum 2013 teacher is defined as a facilitator who has to design the instruction, choose, use the media to be applied in the instruction, and elevate the instruction quality.

Implementation of Kurikulum 2013 which is done SMA Trensains Tebuireng Jombang has been good. However this school still needed the instruction material especially the student worksheet. Other facts explained from result of student questionnaire that 36,8% students felt difficult to understand the subject of the digestion system, 52,6% students said that the cause of the difficulties there was no media to be used for easing students to learn. Students also said that have seldom

done lab work because the lab tools were lacking. Lack of lab tools were caused the school have been exist for 2 years ago so the school have still few lab tools. From the facts will cause the student learning achievement that was less maximal. It was proved by showing percentage 68,4% of 19 students or 13 students were not complete and only 31,6% or 6 students were complete. The result of interview showed that the students are more interested with instruction that using the lab work or using video as a learning media. In fact teachers have often applied teacher centered instruction and teachers became the orator during the instruction was going. The facts showed that the instruction material was required and able to facilitate the students within learning at class.

The instruction has many parts. One of the instruction parts is instruction model. The instruction model which is suitable with Kurikulum 2013 is the guided inquiry model. Applying the guided inquiry make students more active to gain the answer of the problem which have been given by teacher (Anam, 2015). Some researchers also support it. Using that model can give the chance and experience to the students (Lee, 2007). The experience which is gained by students easier to be remembered so their interest of learning can grow continuously (Hamdani, 2011). Using the guided inquiry also showed the significant effect toward the student learning achievement (Sofiani, 2011). Based on the relevant research can be concluded that the superiority of this model is giving the chance to students more active to construct the knowledge so the student learning achievement can be maximal.

The guided inquiry has six steps, there are planning, gaining information, (c) processes information, (d) make information, (e) communicate information, and (f) evaluate (Branch & Oberg, 2004). Using the guided inquiry was considered to be able to increase the students learning achievement.

The digestion system from Biology subject using the guided inquiry was supported with the instruction materials. The developed instruction material is the student worksheet and the assessment instrument. The good instruction material has three criteria, such as validity, practicality, and effectiveness (Akker, 1999). Validity is the measure which shows the validity level on the instrument (Arikunto, 2013). Other opinion about the validity was also stated by Prasetyo (2013) who said that validity as the measure standard which is used to show the accuracy and genuiness the instrument. The instrument which has the high validity value and be able to measure what they want to be measured.

The second criteria of the good material is practically. Practically gives the meaning of the instruction material which is used administratively and technically. The instruction material was not difficult and easy for implementing. If the instruction material is practically, other teacher who were not creator of the material will be able to use.

The third criteria as the good material is effectiveness. The effectiveness tends to the instruction material which is used with the expected result (Akker, 1999) in other hand the material is stated effective if there is a suitable between material and the expected result. The student worksheet have been mentioned above till now there is no the material which is suitable with the third criteria. The researcher wanted make it through the research paradigm of the instruction material development.

METHOD

This research used the research type of ADDIE (*analyze, design, develop, implement, dan evaluate*). The developed instruction material was the student worksheet and assessment instrument of two tier multiple choice. This research used the design of one-group pretest-posttest. This research let the students to be in a group which was observed on the pretest (O₁). Thus it will be continued by doing something to students (X) and doing posttest (O₂) (Sugiyono, 2014).

This research was don at Pascasarjana Universitas Negeri Surabaya in Novemrber 2015 till Mei 2016 and in Agustus 2016 was applied in pilot implementation. The final implementation was done in Januari 2017 at SMA Trensains Tebuireng Jombang class XI. Data collection technique which was used such as: (1) the instruction material of validity; (2) test; and (#) questionnaire of the student respond for collecting the datas that had been done. The datas were measured and analyzed based on quantitive and quality. The instruction material was analyzed with score average on each aspect which is suitable in Tabel 1.

Tabel 1
Criteria of The Instruction Material Validation Assessment Category

Interval Skor	Kategori Penilaian
$3,6 \leq P \leq 4$	Sangat valid
$2,6 \leq P < 3,6$	Valid
$1,6 \leq P < 2,6$	Kurang valid
$1 \leq P < 1,6$	Tidak Valid

(Ratumanan & Laurens, 2006)

The student activity was assessed by three observers which was analyzed using the percentage of agreement and able to be described below:

- $85\% \leq P \leq 100\%$: Good
- $65\% \leq P < 85\%$: Cukup Baik
- $50\% \leq P < 65\%$: Kurang Baik

- $0\% \leq P < 50\%$: Tidak Baik
- (Adopted from Ratumanan dan Laurens, 2003)

Minimum completeness criteria or KKM which is applied at SMA Trensains Tebuireng Jombang in the amount of ≥ 78 . Aspect of knowledge was obtained while pilot implementation and final implementation. The student learning achievement was analyzed by using quadrant chi normalized test and stated unnormal until non-parametric Wilcoxon test was applied.

The student learning achievement on final implementation was analyzed by using quadrant chi normalized test and stated normal until t-test one side was applied. The result of posttest on final implementation which was gained from target of two classes analyzed using not paired t-test with variance homogeneity. T-test two sides not pairing was used for knowing whether have the difference of the learning achievement result in knowledge between class of target 1 and class of target 2. Percentage of student respond was conversed with the criteria based on the Table 2.

Tabel 2
Criteria of Student Respond Result

0% - 20%	Tidak Layak
21% - 40%	Kurang Layak
41% - 60%	Cukup
61% - 80%	Layak
81% -100%	Sangat Layak

(Riduwan, 2006)

The instruction material was stated effectively if the student respond get the minimum percentage 61%.

RESULTS OF RESEARCH

A. Validity

The instruction material which was developed by constructive and content from three validators. The result which was gained on the student constructive worksheet validity with the average score 3,67 till 4. It was stated very valid if the student worksheet can be used as the lesson plan proponent at class until the instruction material can measure what will be measured and meet one of good instruction material characters according to Akker (1999). It is about the validity. The result showed that the developed student worksheet have been ready to be used as the lesson plan proponent though there was little revision about the research formula writing on the student worksheet.

The learning achievement assessment instrument also was validated by its construct that consisted of 14 high rise multiple choice. The result of the learning achievement validation instrument had average score between 2,67 till 4 with valid and very valid criteria.

The learning achievement assessment based on the instruction indicator that wanted to be reached. The instruction indicator was found in the lesson plan. That result showed that the instrument can be stated valid and implemented in the instruction at class. It meant the instrument which was developed be able to measure. So, the learning achievement assessment instrument was valid to be used as the lesson plan proponent.

The instruction material also was validated by content from three validators. The content validity toward the student worksheet was assessed quantitatively. The content validity quantitatively consisted of 4 aspects and gained the average score between 3,67 till 4. Those 4 aspects had very valid with understanding level from the validator between 85,7% till 100%. The first aspect, third, and fourth, three validators dealt if the assessed aspects had been suitable with the relevant theory. The first validator and second validator on second aspect were dealt with the aspect which was assessed but the third validator did not deal it. The result of content validity was stated suitably with theory though the third validator did not deal it. The assessment sheet of knowledge aspect which was developed had a relevance of good content validity because the biology matter (concept, facts, etc.) which became content in each question based biological science principle. According to Akker (2007), the instruction material had been validated by construct and content. It answered the research formulation about the student worksheet using guided inquiry which was developed by construct and content based on the experts.

B. Practicibility

Activity that was done by student on pilot implementation generally in the instruction (asking, answering the teacher question, and discussing in group) also showed the practically instruction material. Final implementation that was done at class the first target and the second target showed almost same matter with the pilot implementation. Most of the students who participated actively in the instruction while observing the video playing, asking, answering the question from teacher, or discussing in a group. It answered the research formulation about the practically student worksheet using the guided inquiry instruction model.

The student activeness during the instruction suited with the Kurikulum 2013 demand. Kurikulum 2013 is the curriculum that is used at SMA Trensains Tebuireng, Jombang. Kurikulum 2013 in its implementation using the student centered instruction that demands students participate actively in the instruction so it was desired the student competency is good in affective, cognitive, and psychomotor. The activeness of student at class suited with the learning goals. The primary goal of the

instruction was encouraging students to be active, brave, and creative in imagining (Anam, 2016). The activeness of student during the instruction showed the student worksheet, it stated practically till it can be used in the instruction in other subjects though it had the little act which less of relevance in the instruction like shouted with friends loudly.

C. Effectiveness of Learning Tools

1. Learning Outcomes of Knowledge Aspect

The learning achievement that can be seen directly the change significantly was the learning achievement about the knowledge aspect of student. The assessment instrument of learning achievement which was applied using the high rise multiple choice based on the instruction indicator in the lesson plan. The assessment instrument of student learning achievement was the question which had a goal to measure the instruction indicator achievement of cognitive aspect which was in the lesson plan. Before it was given to student, the assessment instrument was validated first by three validators. After validation and revision, the instrument of student learning achievement was ready to be examined to the student.

The learning achievement which was gained by students showing there was the learning achievement raising. It also suited with the previously research. The research which had been done by Sofiani (2011), Bilgin (2009), Hasan (2012), dan Ural (2006) stated that using the guided inquiry instruction model will affect positively and significantly in upgrading the achievement and learning outcome. On the pretest, there was no student get the score ≥ 78 . Posttest score result got 72,7% in amount of 24 students were stated complete while 9 other students were stated not complete on pilot implementation. Final implementation on the class of target 1 got the student achievement 83,3% whereas the class of target 2 less of the target 1 class that was 77,8%. The result of the learning achievement depended on the teacher guidance which was given by teacher. It was supported by the research of Kohl and Finkelstein in 2008 and 2007 and Mertayasa (2012). The learning outcome of knowledge aspect that was gained by student showed that the instruction material have suited the criteria of the instruction material according to Akker (1999) that is effectiveness. The learning outcome that was gained student also showed the successful of the instruction material though the completeness that was achieved rather completeness 90%. It was effective and use that can be used based on the praktikum. The results of this study are supported by the previous studies results (Prahani, et al., 2015; Prahani, et al., 2018; Yasir, et al., 2016) that the media, teaching materials, devices, and learning models of quality and feasible (meet the valid,

practical, and effective aspects) can improve student learning outcomes.

2. Students Response

Student respond was useful to know the student respond about the instruction and its material. There was 11 aspects that was assessed by student. Based on the result that was gained and stated the student respond had percentage between 63,6% till 100% with criteria of proper and very proper on pilot implementation., response which was given to students getting the increasing percentage between 66,7% till 100%. It answered the research formula about the effectiveness of the instruction materials which was developed by students. Student response which was given by answering the questionnaire that had been provided. The questionnaire was answered honestly to see the effectiveness of the instruction materials that was developed to the students. There was 11 aspects with the options of "Yes" or "No". The answer was given by students, then those were measured and analyzed using Guttman Scale. The result of measuring that was gained; it would be conversed with adapted criteria from Riduwan (2006).

The result which was obtained showing that the properness of instruction and its materials gained 63,6% till 100% on pilot implementation and 66,7% till 100% on final implementation. The responses from students toward the instruction were not good at all because students have not been accustomed yet with the implemented instruction model. The lowest percentage on pilot implementation was 63,6% and the percentage on final implementation was 66,7% that was given to students with the same aspects. Its aspects which was given to students were language and performance that was used for testing on knowledge aspect. Students felt difficult to understand the meaning of the instrument of learning achievement assessment. It was reversed to the

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validator's assessment. The cause of the lowest student percentage about the learning achievement assessment instrument was the students have not received the instrument like that yet so far. So, the students were shocked but a half of students were interested to do it.

The highest percentage was 100% that was given by students about the discussion aspect with group to help the students to understand the subject. It meant that the instruction materials using the guided inquiry were able to facilitate students to gain the information, process the information, and communicate the information. Besides, the result which was gained be able to show clearly the students activeness in the instruction. The instruction was not tended to teacher centered anymore but tended to student centered now. So, the developed instruction materials based on the student responses can be conclude that it was effective and able to be used in the instruction.

CONCLUSION AND SUGGESTIONS

A. Conclusion

Based on the analysis result and the discussion we can conclude that the developed student worksheet of Biology using the guided inquiry was valid, practically, and effective to be used in the instruction.

B. Suggestions

Some suggestions can be stated by the researcher based on the research that have been done, such as below.

1. The validity aspect of the instruction material that need to be fixed is fixing the content of two-tier multiple choice instrument. It must suit with the biology principle.
2. The practically aspect of the instruction material that need to be fixed is detailing the time allocation each meeting of the instruction in the lesson plan.
3. The instruction material is observed from the effectiveness with giving the guidance of the student worksheet.

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