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The Validity and Practicality of Student Worksheet Based on *Guided Discovery* to Practice Integrated Science Process Skills in Class XII Enzyme Submaterials

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Abstract

Science process skills are overall scientific skills that can be used to find a concept or theory. One method to train the learning process of students is through the guided discovery learning method. Guided discovery-based learning can be applied using student worksheet which is oriented towards scientific discovery activities. This study was designed to produce valid and practical student worksheet based on guided discovery to train integrated science process skills in Enzyme Sub materials. The study was conducted in October 2019 to March 2020 in the Biology Department, Faculty of Mathematics and Natural Science, State University of Surabaya. The type of this research is development research using the ADDIE development model (Analysis, Design, Development, Implementation, and Evaluation). At the time of analysis, it is done by analyzing the curriculum, students, concepts, and assignments. The design stage is completed with designing the student worksheet which is adapted to the syntax of the guided discovery. Further development (including) development, review, and revision, as well as validation of the student worksheet. Later the evaluation (Evaluation) of the validation results will be analyzed and evaluated. Validity is the feasibility of student worksheet which is determined by three validators given by lecturers of materials, education teachers, and high school biology teachers. The validity of the student worksheet was reviewed in terms of content validity, presentation, language, the suitability of the guided discovery method, and integrated science process skills. The method used in this study is the questionnaire method, validation method, and readability test. The instruments used were validation sheets and readability test sheets. Data analysis in the form of descriptive qualitative. The results showed that the guided discovery student worksheet was declared empirically feasible for use in XII high school students, and was declared valid with an average score of validation results of 3.81 with a very valid category and can be used in the learning process.

Keywords: *student worksheet validity, guided discovery, integrated science process skills, enzyme.*

INTRODUCTION

The 2013 curriculum is a new curriculum established by the Indonesian Ministry of Education and Culture to replace the Education Unit Level Curriculum (KTSP). In the 2013 curriculum not only adapted 21st-century competencies in it, but also adopted two other main concepts, namely authentic assessment and a scientific approach (Andrian, 2019). The characteristics of the scientific approach are: 1) student-centered; 2) involves science process skills in constructing concepts, laws or principles; 3) involves potential cognitive processes in stimulating intellectual development, especially students' higher-order thinking skills, and; 4) can develop student character (Hosnan, 2014).

Biology learning activities in the 2013 curriculum are not only limited to the mastery of knowledge and concepts but also include the process of finding concepts based on reality and facts that exist in nature. This is in accordance with following the statement of Suharno (2014), which states that learning biology in the 2013 curriculum also directs students to find out and understand the concept of knowledge. The process of finding a concept can be pursued by conducting experimental or experimental activities. Experimental activities can develop scientific attitudes and science process skills of students.

Science process skills are overall directed scientific skills (both cognitive and psychomotor) that can be used to find concepts or theories, and develop pre-existing concepts (Trianto, 2010). The process skills focus on students to be actively involved in finding concepts so that learning will be meaningful (Karamustafaoglu, 2011). Process skills as a basic

activity in learning science can help students to be active and make knowledge permanent or permanent. One form of learning that can provide learning experiences is practical activities (Lepiyanto, 2014). Roberts (2004) also suggested that experiment activities can be used as a vehicle for learning scientific approaches and training students' scientific skills. Experiment is a learning activity that has the purpose to provide opportunities for students to test and apply a theory using laboratory facilities and outside the laboratory (Rustaman, et al 2005). Wartono (2003) also revealed that experiment activities can make students able to understand the concept and understand the nature of science as a process and product.

Based on Minister of Education and Culture Regulations Number 104 of 2014, there are two types of process skills developed in the 2013 curriculum, they are basic process skills and integrated skills. The science process skills used in this study are integrated science process skills. Integrated process skills include skills in formulating problems, formulating hypotheses, identifying variables, designing research, conducting experiments, obtaining and presenting data, analyzing data, and concluding (Mudjiono, 2013).

Based on the results of preliminary research conducted in class XII IPA 2 of SMA Muhammadiyah 1 Taman through questionnaires, it was found that 82.6% of students were still experiencing difficulties and could not answer correctly in making the formulation of problems, hypotheses, or determining research variables. It can be concluded that the science process skills of Muhammadiyah 1 Taman High School students are still not accustomed to training.

Integrated science process skills in students can be trained through discovery-based learning activities. One discovery-based learning method is *guided discovery. Guided discovery* learning methods can help students to learn and gain knowledge, and develop unique concepts because they can find it themselves (Carin, 1993). This is supported by research conducted by Susanti (2016), which results that the *guided discovery* method can improve the science process skills of students as seen from the value of pretest and posttest which increases after the *guided discovery*-based learning model is applied.

There is a link between the steps of learning by using the *guided discovery* method with indicators of integrated science process skills that will be trained, namely a) stimulus steps and problem identification can train students to formulate problems and formulate hypotheses; b) steps in data collection can train students to identify variables, design experiments, and conduct experiments; c) data processing steps can train students to obtain and present data; d) the proof step can train students to analyze data and e) conclusion steps can train students to conclude the results of the experiment.

The *guided discovery* learning method is learning where students find concepts through an investigation. Students are shown a number of facts and then explore the material learned so that they can make a prediction. Furthermore, students can conduct experiments to find concepts based on concepts that have been given by the teacher or concepts obtained from the results of research by scientists (Poedjiadi, 2010). In the learning process, the teacher acts as a facilitator who guides and manages learning activities so that students can build facts, concepts, and new values needed in real life (Siahaan P., 2017).

Guided discovery-based learning can be applied using student worksheet which is oriented towards scientific discovery activities. *Guided Discovery*-based student worksheet can be used as practical guides that can be used during the learning process and can train students' science process skills through coherent and directed activity stages. This is supported by a statement from Sari (2016), which states that through experiment activities, students can learn science through direct observation of the symptoms and scientific processes, can practice scientific thinking skills, can instill and develop scientific attitudes, and can find and solve various problems through scientific methods. Learning theory accompanied by experiment will create integrated science process skills of trained students (Hariningwang, 2020).

The enzyme is one of the sub materials found in metabolic material. Enzyme sub materials in the 2013 curriculum contained in Basic Competencies 3.2 namely describe metabolic processes as enzymatic reactions in living things and Basic Competencies 4.2 namely making reports of experimental results about the mechanism of action of enzymes, photosynthesis, and anaerobic respiration. Basic Competency demands students to be able to understand the metabolic processes in living things and can making reports on the results of experiments. This cannot be achieved if learning is not accompanied by practical activities.

Student worksheet based on *guided discovery* was is proven to be able to practice science process

skills. This is supported by the results of study development student worksheet based on *guided discovery* for carbohydrate-based catabolism materials by Evanda (2015), that student worksheet based on *guided discovery* can train students 'process skills based on test results, where the completeness of students' process skills indicator results in 96%. A similar study was carried out by Ningrum (2018) in research on the development of student worksheet based on *guided discovery* on photosynthetic material, where the results of the achievement of science process skill indicators obtained results of 83.04%. Similar research was also carried out by Kusumawati (2015), in the research on the development of student worksheet based on *guided discovery* on Pollutions and It's Sources material was declared valid with a score of 3.41.

Based on the problems that have been outlined, the purpose of this research is to produce valid and practical student worksheet based on *guided discovery* to training integrated science process skills for class XII in enzyme sub materials.

METHOD

This research is referred to as ADDIE (Analysis, Design, Development, Implementation, and Evaluation) without Implementation. The stages of the research began from the Analysis stage which was carried out by analyzing several components including curriculum analysis, student analysis, concept analysis, and task analysis. The design stage includes two stages, (1) student worksheet preparation, and (2) student worksheet initial design. At the stage of compile, the student worksheet was referred to the Ministry of National Education (2008) format which includes the title, competencies to be achieved, study instructions, supporting information, assignments, work steps, and assessment. Furthermore, in the initial design phase of the student worksheet, developing student worksheet following the *guided discovery* syntax includes stimulus and problem identification, data collection, data processing, verification, and conclusions, as well as determining the instruments used. The next stage of development (Development) includes the stages of study and revision, validation, and practicality test. At the review and revision stage, the student worksheet that was developed will be revised according to the input and suggestions were given by the examiner lecturers during the proposal seminar. At the validation stage, three validators (material expert lecturers, educational expert lecturers, and high school biology teachers) will conduct an assessment of the feasibility of student worksheet that was developed based on aspects of content, presentation, language, the suitability of *guided discovery* methods, and integrated science process skills. In the practicality test phase, it is carried out through a readability test on student worksheet using the Fry chart. Then in the evaluation stage (Evaluation) the results of the validation and the results of the readability test will be analyzed.

Preliminary research was conducted in October 2019 at Muhammadiyah 1 Taman High School. The development phase was conducted from October 2019 to February 2020 in the Biology Department, Faculty of Mathematics and Natural Science, Universitas Negeri Surabaya. Furthermore, student worksheet was validated by three validators in March 2020.

The research methods used were the questionnaire method, validation method, and readability test method. The instruments used were validation sheets and readability test sheets. Data analysis was performed descriptively qualitatively.

The aspects assessed in student worksheet validation were aspects of didactic requirements, construction requirements, technical requirements, *guided discovery* steps aspects as characteristics of student worksheet, and aspects of integrated science process skills. Student worksheet was validated by three validators namely material expert lecturers, education expert lecturers, and high school biology teacher. Validation values obtained from the three validators were calculated averaged on each aspect. Then the total average of all aspects is calculated and interpreted based on the validation data interpretation as shown in Table 1.

Tabel 1. Criteria for Interpretation Validated Data

Range of Score	Assasment Criteria
1,00 – 1,75	Less valid
1,76 – 2,50	Quite valid
2,51 – 3,25	Valid
3,26 – 4,00	Completely valid

Student worksheet is categorized valid and can be used in the learning process if the average score reaches > 2.51 (Riduwan, 2013).

The student worksheet readability test is conducted to determine the level of difficulty and ease of reading texts to be understood by users based on their level or level of readability. The sample is taken from 100 words from a paragraph. The sample was

taken three times namely 100 words from the beginning, middle, and end paragraphs. The level of readability analyzed using the Fry formula. Formula Fry emphasizes the selection of a representative piece of a paragraph by taking 100 words. This figure is considered representative according to Fry (Payani, et al, 2003).

RESULTS AND DISCUSSION

This research produces valid and practically student worksheet based on *guided discovery* for enzyme sub materials to train integrated science process skills. The development of student worksheet based on *guided discovery* for enzyme sub materials consisting of two topics, namely Student Worksheet 1 with the topic "Temperature and Catalytic Enzyme Work" and Student Worksheet 2 with the topics "Enzyme Concentration and Amylum Change Reaction Speeds". Each student worksheet that was developed had components that showed to the *guided discovery* syntax, and an indicator component of integrated science process skills that will be trained. The explanation of each component as a profile of the student worksheet can be seen in Table 2.

Table 2. Components student worksheet based on *guided discovery*

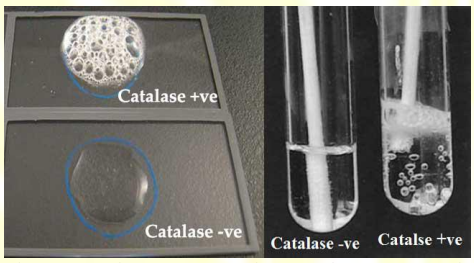
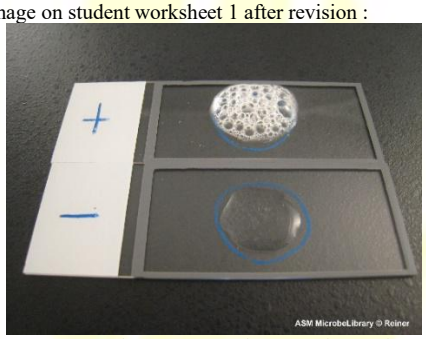
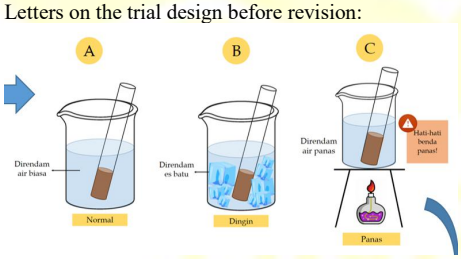
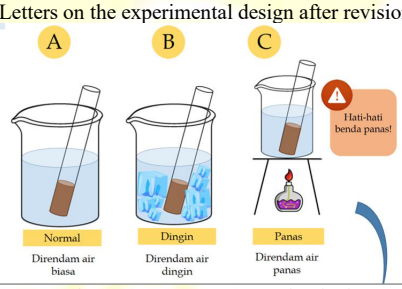
No.	Student Worksheet Components	Description
A.	**General Components**	
1.	Topic	Presented information about learning topics to be studied. The topic on student worksheet 1 is "Temperature and Catalase Enzyme Work" and the topic on student worksheet 2 is "Enzyme Concentration and Reaction Speed of Amylum Change".
2.	Time Allocation	Presented the time allocation needed to do in student worksheet. The time allocation stated in the student worksheet is 2 × 45 minutes.
3.	Learning Objectives	Presented information about learning objectives that need to be achieved after using student worksheet. The learning objectives listed in the worksheet were adjusted to the indicators of integrated science process skills that will be trained.
4.	Instruction for using student worksheet	Present sequential steps regarding instructions for using the student worksheet. The instructions in student worksheet include the activities in worksheet done in groups consisting of 4-5 students, activities in student worksheet compatible with the instructions that have been presented, as well as providing tools and materials that will be needed carefully.
B.	***Guided Discovery* Syntax**	
5.	Stimulation and Problems Identification	Presented readings, information, and images that were appropriated to the learning objectives to guide students in formulating problems and developing hypotheses.
6.	Data Collecting	Directed students in collecting data to identify experiment variables, design and conduct experiments.
7.	Data Processing	Presented instructions for making good and correct data tables and directing students to obtain and present experimental data.
8.	Verification	Presented questions related to the experimental data that has been obtained, and direct students to analyze data.
9.	Conclusion	Directed students to make conclusions.
C.	**Integrated Science Process Skills Indicators**	
10.	Formulated problem	Presented readings and images that can direct students to formulate problems.
11.	Formulated hypotheses	Presented readings and images that can direct students to formulate hypotheses.
12.	Identified variabels	Presented instructions and examples for each variable that can direct students to identify the experimental variables including control, manipulation, and response variables.
13.	Arranged plan and conducted an experiment	Presented pictures of experimental steps that can lead students to make the flow diagram and as a guide to facilitate students in conducting experimental activities.
14.	Presented data	Presented instructions to present a good and correct table that can lead students to present the experimental data in table form.
15.	Analyzed data	Presented coherent questions that can lead students to analyze the results of

No.	Student Worksheet Components	Description
		experiments that have been conducted.
16.	Concluded	Present instructions and examples in making conclusions that can lead students in making conclusions based on experiments that have been conducted.

a) Validity of Student Worksheet

The beginning stage of development the student worksheet based on *guided discovery* is the initial design stage of student worksheet 1 and 2. Furthermore, the initial design of student worksheet will be reviewed by the supervisor and revised according to the advice given by reviewers to produce student worksheet that is ready for seminar. Student worksheet 1 and 2 will be reviewed by the examiner lecturer during the proposal seminar so that get suggestions for improvement. The revision of student worksheet 1 and 2 was carried out by the recommendation of the examiner lecturer and produced student worksheet that was ready to be validated by the validator. The results of the study and revision of the developed student worksheet can be seen in Table 3.

Tabel 3. Results based on recommendation and revision of *guided discovery* student worksheet to train integrated science process skills

No.	Suggestions	Revision Results
1.	Completed the source of the references including name and year in the figure student worksheet 1 and 2 reading, and completed the sentences. Image on student worksheet 1 before revision :  Figure 1. The presence of a catalase enzyme is characterized by the formation of gas bubbles when dripped with H_2O_2	Added information in the form of references or referenced sources, and improved the preparation of sentences so that students can easily understand. Image on student worksheet 1 after revision :  Figure 1. Catalase test results are shown by the formation of gas bubbles when dripping H_2O_2; A) positive catalase enzyme, B) negative catalase enzyme. Source: asmscience.org
2.	The letters in the experiment design were too small. Letters on the trial design before revision:  	Edited the font size in the experiment design. Letters on the experimental design after revision: 
3.	The sentences in the instructions column had double meaning. Examples sentences before revision: *Example: How does the volume of water affect the height of the green bean plant?*	Improved sentences structure so that had not multiple meanings. Example sentences after revision: *Example: What is the effect of the volume of water given on the height of the green bean plant?*
4.	The titles on student worksheet 1 and 2 were less specific Titles on student worksheet before revision:  	Edited the title on student worksheet to be more specific. Titles on student worksheet after revision: 

	LEMBAR KERJA PESERTA DIDIK 2 PERCOBAAN UJI ENZIM AMILASE	LEMBAR KERJA PESERTA DIDIK 2 ENZIM AMILASE
5.	In the *guided discovery* step 'Data Processing' there were no questions or activity commands for students.	Added a question in the *guided discovery* step 'Data Processing'. Question after revision: "Based on the experiments you have done, make the results of your experiments in table form!"

The *guided discovery* student worksheet that was developed will be validated by three validators afterward. The validity was assessed based on five main criteria, namely the presentation aspects, the content aspects, the language aspects, the suitability aspects of the *guided discovery* method, and the integrated science process skill aspects. As for the results of the validation can be seen on Table 4.

Table 4. Validity of Student Worksheet

No	Criteria Assasment	Score			Mean
		V1	V2	V3	
A.	**Technical requirements (presentation aspects)**				
1.	Cover display	4	4	4	4
2.	Letter accuracy	4	4	3	3,67
3.	Student worksheet topic	4	4	4	4
4.	Time allocation	4	4	4	4
5.	Learning objectives	4	4	4	4
6.	Instructions for using student worksheet	4	4	4	4
7.	Suitability of tools and materials	4	4	4	4
Average Score				**3,95 (Completely valid)**	
B.	**Didactic requirements (content aspects)**				
1	Accuracy of activities in student worksheet	4	4	4	4
2.	The suitability of the materials with the students ability	4	3	3	3,33
3.	Accuracy of material and concepts	4	3	4	3,67
Average Score				**3,67 (completely valid)**	
C.	**Construction requirements (linguistic aspects)**				
1.	Languange used	4	4	4	4
2.	The accuracy of sentences structure	4	4	3	3,67
Average Score				**3,83 (completely valid)**	
D.	***Guided Discovery* Steps**				
1.	Stimulation and identification problems step	4	4	3	3,67
2.	Data collection step	4	4	4	4
3.	Data Processing step	4	4	4	4
4.	Verification step	4	4	4	4
5.	Conclusion step	4	4	4	4
Average Score				**3,93 (Completely valid)**	
E.	**Achievement of integrated science process skills with the *guided discovery* steps**				
1.	Listed aspects of integrated science process skills	4	4	4	4
2.	Trained students to formulate problems	4	4	4	4
3.	Trained students to formulate hypotheses	3	4	4	3,67
4.	Trained students to identify variables	4	4	4	4
5.	Trained students to design diagram experiment and conducting experimental activities	4	4	4	4
6.	Trained students to present data experiment results	4	4	4	4
7.	Trained students to analyze data	3	4	4	3,67
8.	Trained students to make conclusion	3	4	4	3,67
Average Score				**3,87 (Completely valid)**	
Average score of total validation results				**3,81 (Completely valid)**	

Information:
V1 = Materials expert lectures
V2 = Education expert lectures
V3 = High school biology teacher

The results of the recapitulation of validity assessments on each aspect can be presented in Table 5.

Table 5. Recapitulation of Student Worksheet Validation Results

No.	Criteria	Mean	Category
1.	Technical requirements	3,95	Completely valid
2.	Didactic requirements	3,67	Completely valid
3.	Construction requirements	3,83	Completely valid
4.	*Guided discovery* steps	3,86	Completely valid
5.	Achievement of integrated science process skills with the *guided discovery* steps	3,87	Completely valid
Average score of student worksheet validity		**3,81**	**Completely valid**

The validity results presented in Table 5 showed that the results of the validation aspects of the

presentation in the technical requirements reached a score of 3.95; content aspect validation in didactic requirements reached a score of 3.67; validation of linguistic aspects in construction requirements reached a score of 3.83; aspects of *guided discovery* steps reached a score of 3.86; aspects of achieving the goal of training integrated science process skills with the *guided discovery* step gained a score of 3.87. The five aspects of validity afterward calculated and gained an average score of the validity 3.81 with a category completely valid.

Based on the validation results that have been described, it showed that the developed student worksheet had fulfilled the requirements for student worksheet preparation. This can be seen from the average score obtained in each aspect which obtained a completely valid category. The student worksheet that was developed in this research was included in the appropriate category for use in the learning process because it fulfilled technical, didactic, and construction requirements. This is in accordance with the opinion of Wijayanti (2008), which states that student worksheet is very influential on the teaching and learning process, so the student worksheet that is composed must meet the technical, didactic, and construction requirements.

The validation results were obtained completely valid because in the mechanism of its preparation and development through several stages adapted from Thiagarajan et al. (1974) which included 1) curriculum analysis; 2) analysis of students' needs which includes tasks and concepts; 3) preparation of student worksheet in consultation with the supervisor; 4) revision of student worksheet based on suggestions and input from the supervisor to produce draft 1; 5) draft 1 will be held in a seminar to obtain input and suggestions from examiners; 6) the second revision in accordance with the advice of the examiner lecturer and produce draft 2; 7) draft 2 is validated by the validator; 8) the third revision was based on suggestions and input from the validator to obtain draft 3. This is according to Fatmawati (2016) which states that to produce a good quality student worksheet is necessary to develop gradually and continuously through various stages and revisions so that it is produced a valid student worksheet.

The first validity assessment of student worksheet was the aspect of presentation in technical requirements. There were seven components of assessment in the presentation aspect, namely cover display, the accuracy of type and size of the letters, title and topic of student worksheet activities, time allocation, learning objectives, instructions for using student worksheet, and accuracy of tools and materials. In the aspect of the presentation, student worksheet gained 3,95 in an average score of validation with a completely valid category. In the sub-aspects of the cover display, title and topic of student worksheet activities, time allocation, learning objectives, instructions for using student worksheet, and accuracy of tools and materials, gain the average score of the results 4 with completely valid categories. However, the sub aspect of letter accuracy was low with an average score of 3.67. The low score obtained on these components is due to the letters used in the instructions component not printed in bold or italic so there was no emphasis on important information contained in student worksheet. This is consistent with the statement of Arsyadi (2009), which states that bold or italicized letters can emphasize keywords or titles so that they can guide and draw attention to important information.

The second validity assessment of student worksheet was the didactic aspect in terms of content. in the didactic aspect, there were three components of assessment, namely the accuracy of the activities, the suitability of the material with the academic ability of students, and the accuracy of the concepts and materials. In the didactic requirements, a student worksheet that was developed gain average validation score 3,67 with category completely valid. The activities and questions component in student worksheet can help students to find the concept of gaining a perfect validation average score that was 4 with a completely valid category. This showed that the student worksheet was in accordance with the steps of *guided discovery* learning that invited students to be actively involved in finding concepts. This is in accordance with the opinion of Ghozali (2014), which states that *guided discovery*-based learning activities were student-centered based learning because students were required to be actively involved in finding their own concepts through a series of activities in accordance with the *guided discovery* phases. Whereas in the sub-aspect of the suitability in student worksheet with students' level of thinking, the average score of validation was 3.33. The low score obtained in this sub-aspect is due to the readings presented in student worksheet may not be used for all students with different levels of thinking ability (low, medium, and high). In the sub-aspects of material suitability presented, the average validation score was 3.67. This

was because the reading presented is new information for students so it is still abstract. The questions presented were still too short so the student had not been able to direct hypotheses based on the readings that have been presented.

The third validity assessment of student worksheet was the linguistic aspect of the construction requirements. There were two components of language that are used, namely the use of language and sentence structure. In the linguistic aspect, obtain the validity score 3.83 with a completely valid category. In the component of the language used obtained a perfect score of 4. This showed that the language used in the student worksheet was in accordance with enhanced spelling (EYD), did not cause multiple meanings so that it could be easily understood by students. The language used must be in accordance with the maturity level of students, and the sentence structure used in student worksheet is easily understood by students so it did not cause double meaning to a statement (Prastowo, 2011). Whereas the sentence structure component gets an average validation score of 3.67. This because reading on stimulus and identification problems use too long and not simple enough sentence structure, which makes it difficult for students to understand. Student worksheet will be stated properly if it is easy to understand, the language used was in accordance with the level of thinking of students, and uses clear, concise, simple sentences and does not cause multiple meanings (Widjajanti, 2008).

The fourth validity assessment of student worksheet was the aspect of *guided discovery* steps. The *guided discovery* step aspect had five assessment components which were the steps of the *guided discovery* learning method. The components of *guided discovery* include stimulation and identification of problems, data collection, data processing, verification, and conclusions. The sub-aspect of the *guided discovery* step is data collection, data processing, verification, and conclusions obtained 4 with a perfect validity score with a completely valid category. Whereas the stimulus component and problem identification obtained the lowest validation score of 3.67. The low score obtained is due to the readings presented in the stimulus and identification problem was considered to still not be able to provide stimulation and direct students to formulate the problem and hypothesis. In addition, the questions given were also not able to direct students to make problem statements and formulate hypotheses. Regarding this matter, researchers had made improvements according to the input and suggestions were given by the validator by changing the sentence structure to be more simple so that it is easy for students to understand and can direct students into making problem statement and formulating hypotheses.

The *guided discovery* steps aspect obtained an average score of validation results 3.86 with a valid category. This showed the *guided discovery* step contained in student worksheet can train students' science process skills. Theoretically, the worksheets developed can train students' science process skills because they contain steps in the scientific method namely formulating problems, identifying variables, compiling hypotheses, defining variables, designing research and conducting experiments, and formulating conclusions based on experiments (Ibrahim, 2010).

The fifth student worksheet validity assessment is the aspect of achieving the goal of training integrated science process skills with the *guided discovery* step. In the aspect of achieving the goal of training integrated science process skills with a *guided discovery* step, gain the average validation score 3.87 with a completely valid category. This showed that student worksheets developed can train students' integrated science process skills through the *guided discovery* learning steps. The sub aspects assessed include; include aspects of integrated science process skills that were trained, trained to formulate problems through the steps of stimulation and identification of problems, trained to make hypotheses through stimulation and problem identification steps, trained to identify variables through data collection steps, trained in designing and conducting experiments through data collection steps, trained in obtaining and presenting data through data processing steps, trained to analyze data through data processing steps, and trained in making conclusions through conclusion steps.

In the component formulating the problem, identifying variables, designing and conducting experiments, and presenting data obtained an average score of perfect validation results, 4 with very valid categories. While the component train the students compile hypotheses, analyze data, and make conclusions gain an average score of validation results 3.67. The low score obtained on the component of training students to construct hypotheses is due to the readings and the questions presented were still not able to direct students to form hypotheses, so students were still having difficulty in making hypotheses based on

the readings that have been presented. In analyzing data components, the sentence structure of the questions presented is less simple and still caused multiple meanings, so it is still lacking to direct students in answering correctly. For the component of training students to make conclusions, the instructions given are still unclear so it was not enough to direct students to make conclusions properly and correctly. Regarding this matter, researchers had made improvements according to the suggestions of the validator to change sentences that still cause multiple meanings into more simple sentences so it fits the criteria of the good student worksheet. According to Darmodjo and Kaligis (1992) on the language criteria, the language used on student worksheets had to easily understood, clear, and in accordance with the level of maturity of students.

b) Theoretical Practically of Student Worksheet

The practicality of student worksheet based on the *guided discovery* in enzyme sub materials is reviewed through readability. Readability is the level of difficulty and ease of reading texts to be understood by users, so the level of readability should be adjusted to the ability of users (Widyaningsih, 2015). The level of readability analyzed using the Fry formula. Formula Fry emphasizes the selection of a representative piece of a paragraph by taking 100 words. Student worksheet readability test based on *guided discovery* is carried out on three random reading samples, namely at the beginning, middle, and end of the student worksheet. The three samples are expected to be able to represent the entire contents of student worksheet.

The selected paragraph is the main topic of the student worksheet enzyme which was related to the catalase and amylase enzymes. Readings taken are readings that are composed of at least 100 words. After obtained 100 words, the syllables are calculated until the 100th word and the result is multiplied by 0.6. In addition to counting the number of syllables, the number of sentences that make up the paragraph is also carried out. Then the results obtained will be converted into a Fry graph. The recapitulation of the readability level and the readability test results on the Fry graph can be seen in Table 6 and Figure 1.

Table 6. Recapitulation of Readability Level Student Worksheet Based on *Guided discovery*

Sample	Page	Number of Sentences	Number of Syllables *0,6
Early	2	6	260 × 0,6 = 156
Middle	2	13	269 × 0,6 = 161
End	12	13	277 × 0,6 = 166,2
Average		**8,3**	**161**

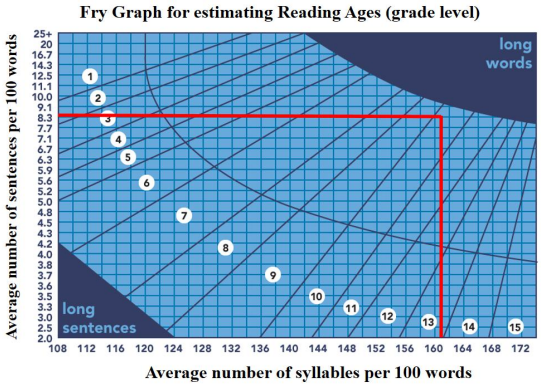


Figure 1. Readability test results on the Fry Graph

Based on the results of practicality using the readability test, the results were the number of sentences from the three samples obtained an average of 8.3. For the number of syllables in the three samples that have been taken to obtain an average of 161. Furthermore, the results of the number of sentences and the number of syllables that had been obtained will be drawn a line on the Fry graph with the result that a meeting point is found to be a reference to determine the level of readability student worksheet.

Based on Figure 1 it can be seen that the meeting point between the number of sentences per 100 words and the number of syllables per 100 words that have been multiplied meet at the point (8.3; 161) by referred to level 10. The results of the meeting point indicate that the *guided discovery* student worksheet is suitable to use by high school grade class XII student readers. This is in accordance with the statement from Himala (2016), which states that if in the learning activities of the textbooks students used had a level of readability above their class, students will have difficulties in obtaining information. Based on the results of the readability test that has been done (Table 6), it can be seen that there is a continuity between the level of readability with the target users of student worksheet namely class XII high school students so that the student worksheet based on *guided discovery* is declared practical to use and theoretically feasible in terms of readability.

CONCLUSION

Based on the analysis and discussion that had been explained, it can be concluded that student

worksheet based on *guided discovery* to train students' integrated science process skills in enzyme sub materials is represented practically with an average syllable of 161 and can be used for high school class XII students, and obtain validity results amounted to 3.81 with a completely valid category and can be used in the learning process to train students' integrated science process skills.

SUGGESTION

Further development is needed in other materials so that students' integrated science process skills can be accustomed to training and further implementation needs to be done on a wider scale to find out the practicality and effectiveness of the student worksheet that was developed in the learning process.

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