DEVELOPMENT OF STUDENT E-WORKSHEET BASED ON GUIDED INQUIRY OF ENVIRONMENTAL CHANGE MATERIAL TO TRAIN SCIENCE PROCESS SKILLS FOR 10TH GRADE HIGH SCHOOL

Pengembangan Lembar Kerja Peserta Didik Elektronik Berbasis Inkuiri Terbimbing Materi Perubahan Lingkungan untuk Melatihkan Keterampilan Proses Sains Kelas X SMA

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Abstract

This research aims to produce an E-Worksheet based on guided inquiry of environmental change material to train students' science process skills that are theoretically and practically valid. This research used the 4-D development model; define, design, develop, and disseminate, but without the dissemination stage. The parameters in this study were the validity of the e-worksheet based on the validation results and the implementation of students' e-worksheet in terms of activity observation results and student responses. The targets or objects used in this study were 25 students of class X-14 SMA Al-Islam Krian. The research was conducted in December 2022 – June 2023. The research instruments used validation sheets, student activity observation sheets, and response questionnaire sheets. Data collection techniques were validation techniques, observation techniques, and questionnaire methods. Data analysis was carried out quantitatively descriptively. The results showed that the e-worksheet was declared very valid, with a validity score of 3.8 based on theoretical validity. The implementation of the e-worksheet developed in terms of the results of student activities got a percentage score of 100% with a very good category. The results of students' responses to the e-worksheet were very positive, with a percentage score of 98.7%. Based on these results, the e-worksheet developed was valid and feasible.

Keywords: E-worksheet, Guided inquiry, Science process skills, Environmental change material

Abstrak

Tujuan penelitian ini adalah menghasilkan E-LKPD berbasis inkuiri terbimbing materi perubahan lingkungan untuk melatihkan keterampilan proses sains peserta didik yang layak dan valid secara teori dan empiris. Penelitian ini menggunakan model pengembangan 4-D tanpa dilakukan tahap *dissemination.* Parameter yang diteliti meliputi validitas E-LKPD berdasarkan hasil validasi dan keterlaksanaan E-LKPD ditinjau dari aktivitas dan respon peserta didik. Sasaran atau objek yang digunakan pada penelitian ini yaitu 25 peserta didik kelas X-14 SMA Al-Islam Krian. Penelitian dilakukan pada bulan Desember 2022 - Juni 2023. Instrumen penelitian yang digunakan yaitu lembar validasi, lembar observasi aktivitas peserta didik dan lembar angket respon. Teknik pengumpulan data yaitu teknik validasi, teknik observasi, dan metode angket. Analisis data dilakukan secara deskriptif kuantitatif. Hasil penelitian menunjukkan bahwa E-LKPD dinyatakan valid dengan skor validitas 3,8 kategori sangat valid. Keterlaksanaan E-LKPD yang dikembangkan ditinjau dari aktivitas peserta didik sebesar 100% kategori sangat baik, dan respon peserta didik terhadap E-LKPD sangat positif sebesar 98,7%. Berdasarkan hasil tersebut menunjukkan bahwa E-LKPD valid dan layak untuk diterapkan.

Kata kunci : E-LKPD, Inkuiri terbimbing, Keterampilan proses sains, Perubahan lingkungan

INTRODUCTION

The development of the Era of Society 5.0 presents a fast and integrated life in technology. In the educational aspect, there is a need for curriculum development to achieve the target of the 5.0 era, one of which is through curriculum renewal. In early 2022, Indonesian government implemented an independent curriculum that included learning outcomes based on the decision of the head of BSKAP of the Ministry of Education and Culture, Number 008/H/KR/2022, concerning Learning Outcomes in PAUD and Dikdasmen in the Independent Curriculum. This decision requires students to have the skills to analyze problems and present solutions to problems; one of the skills that are the focus is science process skills (Permendikbud, 2022).

Science process skills allow students to gain knowledge based on events/phenomena through scientific investigations (Kamal et al., 2020). The science process skills that are the focus of this research are

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integrated science process skills including formulating problems, formulating hypotheses, identifying variables, defining variables, experimenting, analyzing data, and concluding. Based on interviews conducted with SMA Al-Islam Krian biology teachers, students' science process skills were still less applied in the teaching process. Teachers were still focused on the conventional concept/material provision learning, so students' skills in analyzing a phenomenon/problem based on the scientific method were still relatively less. The urgency of learning outcomes for these skills requires teachers to implement teaching materials that can facilitate students in achieving these science process skills.

Science process skills align with guided inquiry learning; in inquiry learning, students learn to find problems, analyze problems, organize findings, find solutions, and experiment with the solution. Therefore, the inquiry model, especially guided inquiry, is considered to facilitate and develop science process skills. It also aligns with the study conducted by Mala Sari (2017), who found that the guided inquiry learning model impacts students' science process skills.

Environmental change material relates to phenomena and events in students' lives. Environmental change material can provide learning experiences for students through an ecological orientation emphasizing experimental work. Therefore, it can directly align with the guided inquiry learning model, where the teacher acts as a facilitator who guides and provides opportunities for students to express solutions/ideas to environmental problems by conducting a student-centered learning experiment (Ade, 2018).

Student worksheets must be developed to accommodate these learning activities. During the development of the era, this worksheet innovated into electronic form, better known as Electronic Student Worksheets (E-Worksheet). The advantages of using e-worksheet include: (1) motivating students to master the subjects to be studied; and (2) facilitating students to demonstrate their ability to improve their thinking process skills through puzzle-solving activities by searching, speculating, and even reasoning (Astuti et al., 2018). This electronic form makes it easier for teachers to communicate learning materials more effectively through interactive components (Ayuni & Tressyalina, 2020). The developed e-worksheet has advantages, including students' steps/activities in inquiry learning to achieve science process skills in different main features and interactive features, so it can facilitate students to complete the characteristics of science process skills. The main components are Bio-Observe, Bio-Create, Bio-Thesis, Bio-Investigate, Bio-Try, Bio-Analyze, and Bio-

Conclude, each of them facilitates students in carrying out activities tailored to the specified integrated science process skills indicators.

This study aims to develop a valid and feasible electronic student worksheet based on guided inquiry on environmental change material to train the science process skills for 10th grade high school. This development research can be one of the innovative teaching materials educators use to facilitate and teach science process skills in the learning process.

METHOD

The research was development research with an e-worksheet product based on guided inquiry on environmental change material to train students' science process skills. This development uses the 4-D model with four main stages: Define, Design, Develop, and Disseminate. But without the Disseminate stage or dissemination.

The define stage, the formulation and analysis related to curriculum analysis to determine learning objectives, material analysis, and also learner analysis. At the Design stage, the reviewer reviewed the initial design of the e-worksheet. At the Develop stage, the validation stage is carried out by validators and limited trials for students.

This research was conducted in December - June 2023, with the stages of implementation being product development, validity testing, and limited trials. The sample used in this study were 25 students of class X-14 SMA Al-Islam Krian. The parameters/aspects observed were validity obtained from the results of validity by validators, implementation obtained from the results of observation of student activities, and students' responses to the developed e-worksheet.

The research instruments used to collect validity data were validation sheets, therefore the implementation data of the worksheet used student activity observation sheets, and response questionnaire sheets. The validity data collection technique is obtained from the validation results by three validators with assessment aspects: technical aspects, didactical aspects, construction aspects, suitability for the guided inquiry model, and e-worksheet activities that can train students' science process skills (Mazidah et al., 2019). The validity score based on the Likert Scale assessment in Table 1 below:

Table 1. Likert Scale

Scale Score	Categories
1	Invalid
2	QuiteValid
3	Valid
4	Very Valid

(Sugiyono, 2016)

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The results of the validity score obtained were then analyzed using the following formula: (Rusmini, 2019)

$$Average = \frac{total\ score\ of\ each\ component\ from\ validators}{total\ of\ validators} ......(1)$$

The scores obtained from all aspects were summed up and analyzed descriptively, referring to the average score obtained and described with score criteria as in the following table:

Table 2. Validation criteria of the E-Worksheet

Validation score	Criteria
0-1,75	Less Valid
1,75-2,50	Quite Valid
2,51-3,25	Valid
3,26-4,00	Very Valid

(Riduwan, 2013)

The data collection technique of e-worksheet implementation was reviewed by observing students' activities through an observation sheet conducted during the learning process and the results of students' responses using a questionnaire sheet filled in after learning through the e-worksheet (Aldi, 2022). The data was analyzed using a *Guttman* scale: get score 1 if you get the answer "Yes" and score 0 if you get the answer "No". Data on the results of observing students' activities and the results of the responses obtained were then analyzed using the formula:

$$Percentage\ (P) = \frac{\Sigma\ score}{\Sigma\ total\ score} x100\ \% ...(2)$$

The percentage obtained from the student activities results was then analyzed descriptively and categorized based on the following Likert scale:

Table 3. Interpretation Criteria

Observation Activity's Percentage (%)	Categories
0-40	Not Good
41-55	Less Good
56-70	Quite Good
71-85	Good
86-100	Very Good

(Modified from Riduwan, 2013)

Based on the criteria, an e-worksheet is declared good if it gets a percentage score of≥71% based on the result of student activities contained in the observation sheet. The results of the student's responses were analyzed descriptively and categorized based on the following data:

Table 4. Interpretation of Responses Criteria

Student's Responses Percentage (%)	Categories
0 – 40	Not Positive
41 – 55	Less Positive
56 – 70	Quite Positive
71 – 85	Positive
86 – 100	Very Positive

(Modified from Riduwan, 2013)

Based on the criteria, an e-worksheet is declared to get a positive response from students if the average scores are≥71%.

RESULT AND DISCUSSION

The results of this development research was an e-worksheet product based on guided inquiry on environmental change material to train science process skills, e-worksheet validity results, and e-worksheet implementation results in terms of activity observation results and student responses after participating in learning using the developed e-worksheet.

Description of E-Worksheet Product

The e-worksheet product developed is an electronic student worksheet based on guided inquiry learning on environmental change material integrated with science process skills indicators. The display main cover of the developed e-worksheet can be seen in figure below:
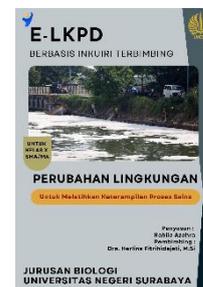

Figure 1. The main cover of e-worksheet

The e-worksheet contains two learning activities; the first e-worksheet contains student activities to make an eco-enzyme as an effort to process organic waste. The second e-worksheet contains student activities to conduct practicum testing of eco-enzymes to overcome the detergent waste.
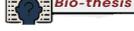

(a)　　　　(b)

Figure 2. (a) 1st E-worksheet ; (b) 2nd E-worksheet

The Activities in the e-worksheet are supported by several features that support the guided inquiry-based learning process to train students' science process skills, including interactive elements in it. The description of the e-worksheet features is shown in Table 5:

Table 5. Features of the E-Worksheet

Features	Description
Bio-Observe	It contains activities to direct students to do the observations of pollution problems in the surrounding environment
Bio-Creat	It contains student activities to formulate problems based on analyzing the issues presented.
Bio-thesis	It contains student activities to formulate hypotheses based on the formulation of the problem
Bio-investigate	It contains activities that direct students to identify and define variables and design experiments.
Bio-Try	It contains student activities for conducting experiments
Bio-analyze	It contains student activities to analyze data and evidence of experimental results
Bio-Conclude	It contains student activities to summarize or conclude the result of experiments
Explore	It contains a command to direct students to open a web/page related to the e-worksheet steps.
Clue	It contains information instructions to help students answer questions/steps in the e-worksheet.
Fyi	It contains additional information to help students understand the steps in the e-worksheet.
U-tube	It contains a command to direct students to open and explore videos on YouTube as additional information.

The product specifications of the developed e-worksheet are contained in the following below:

Table 6. Specifications of E-Worksheet

Aspect	Description
Characteristics of e-worksheet	a. In the form of digital data b. The file format is HTML c. The e-worksheet has a flip transition effect (back and forth) from one page to the next. d. There is a hyperlink to access certain content in the e-worksheet e. A link facilitates students to access material on the internet or youtube f. Some photos and videos support learning through the e-worksheet
Use of e-worksheet	a. An e-worksheet can be accessed through laptops and devices b. It can access through the link: *https://online.flippingbook.com/view/244545902/*
Content Material of e-worksheet	a. The material content is based on describing the learning outcomes of Class X Biology in the independent curriculum. b. The material's content discusses environmental balance, environmental damage, pollution, types of waste, and waste management. c. There are several features in supporting the achievement of students' science process skills

The Validity Result of E-Worksheet

The validity of an e-worksheet obtained through a validation process that is carried out to determine the product's validity level. In this study, verification was carried out by three validators; biology education expert lecturers, biology expert lecturers, and SMA Al-Islam Krian biology teacher with assessment aspects: technical aspects, didactical aspects, construction aspects, suitability for the guided inquiry model, and e-worksheet activities that can train students' science process skills (Mazidah et al., 2019). A recapitulation of the validity results presented in the following Table 7.

Table 7. Result of E-Worksheet Validation

No	Criteria	Score v1	v2	v3	Average	Category
A. Technical Aspect						
1.	The cover design is attractive and appropriate to the topic of the activity	4	4	3	3,6	Very Valid
2.	The title of the e-worksheet represents the content and topic of the activity	3	4	4	3,6	Very Valid
3.	The presentation of images and color composition in the e-worksheet is interesting	4	4	4	4	Very Valid
4.	The selection of typeface on the e-worksheet is appropriate	3	4	3	3,3	Very Valid
5.	The components of the developed e-worksheet are appropriate and complete	4	4	4	4	Very Valid
6.	Quality Features in the e-worksheet attract learners' attention	4	4	3	3,6	Very Valid
Average Score of Technical Aspect					3,7	**Very Valid**
B. Didactic Aspect						
7.	Activities in the e-worksheet are following the learning objectives	4	4	3	3,6	Very Valid
8.	Activities in the e-worksheet are on the level of thinking of students	3	4	4	3,6	Very Valid
9.	The material presented follows the learning activities	4	4	3	3,6	Very Valid
Average Score of Didactic Aspect					3,6	**Very Valid**
C. Construction Aspect						
10.	The language used in the e-worksheet	4	4	4	4	Very Valid

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No	Criteria	Score			Average	Category
	is easy to understand					
11	Using effective sentences	4	4	4	4	Very Valid
Average Score of Constructions Aspect					**4**	**Very Valid**
D.	**Learning of Guided Inquiry**					
12	**Investigation (Observation) of a phenomenon**					
	Facilitate students' activities in observing/investigating a phenomenon	4	4	3	3,6	Very Valid
13	**Formulating a problem**					
	Facilitate students' activities in formulating a problem	4	4	4	4	Very Valid
14	**Formulating hypothesis**					
	Facilitate student's activities in formulating research hypotheses	4	4	4	4	Very Valid
15	**Planning the Investigation**					
	Facilitate students' activities in planning/designing research	4	4	4	4	Very Valid
16	**Conducting Experiments**					
	Facilitate students' activities in conducting a research experiment	4	4	4	4	Very Valid
17	**Analyzing of the Data's Experiments**					
	Facilitate learners' activities in analyzing data from experiments	4	4	4	4	Very Valid
18	**Conclude**					
	Facilitate students' activities in concluding the analysis results.	4	4	4	4	Very Valid
Average Score of Guided Inquiry Aspects					**3,9**	**Very Valid**
E.	**Achievement of Integrated Science Process Skills through Guided Inquiry Steps**					
19	The e-worksheet lists the aspects of integrated science process skills; a) formulating problems, b) formulating hypothesis c) controlling variable, d) defining operationally, e) experimenting, f) interpreting data, g) formulating models	4	4	4	4	Very Valid
20	e-worksheet can train students to formulate	4	4	4	4	Very Valid

No	Criteria	Score			Average	Category
	problems					
21	e-worksheet can train students to formulate hypotheses	4	4	3	3,6	Very Valid
22	e-worksheet can train students in identifying variables (controlling variables)	4	4	4	4	Very Valid
23	e-worksheet can train students in defining operational variables (defining operationally)	4	4	4	4	Very Valid
24	e-worksheet can train students to conduct experimental activities	4	4	4	4	Very Valid
25	e-worksheet can train learners in data analysis skills (interpreting data)	4	4	4	4	Very Valid
26	e-worksheet can train learners to make conclusions	4	4	3	3,6	Very Valid
Average Score of Science Process Skill's Aspects					**3,9**	**Very Valid**
AVERAGE SCORE OF E-WORKSHEET VALIDITY					**3,8**	**Very Valid**

Based on the average validity score obtained from each aspect, the overall validity score of the e-worksheet was 3.8 with a very valid category (Riduwan, 2013). The result indicates that the e-worksheet is declared valid and thus suitable for use as teaching materials in the learning process and worth continuing for the trial process.

The technical aspect assessment obtained a validity score of 3.7 with a very valid category (Riduwan, 2013). The technical aspect reviews the aesthetic value of an e-worksheet product developed. In this research, the technical aspect was reviewed by the cover's appearance, presentation of images and color composition, selection of fonts, components, and quality of features in the e-worksheet. The result has shown that technically the appearance, images, format, and display features in the e-worksheet are arranged attractively to add to the aesthetic value of a teaching material that can increase the interest of students in participating in learning. This statement aligns with the information of Rizky (2020), which states that the development of an e-worksheet must pay attention to aesthetic value, namely the appearance, images, letters, and other components that can attract students' attention during the learning process.

The didactic aspects assessment obtained a validity score of 3,6 with a very valid category (Riduwan, 2013).

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This aspect reviewed the learning components in an e-worksheet that can make it easier for students to understand a topic. Based on that result, the didactic aspects examine the suitability of the activities in the e-worksheet and the material presented with the learning objectives and students' level of thinking. The result indicates that the activities in the e-worksheet are valid and suitable to the learning objectives based on the established achievements of the independent curriculum and it can be used with various levels of thinking of students. The e-worksheet activities can invite students to be actively involved in learning. These results align with the purpose of using teaching materials in learning, that is to activate students in finding concepts, directing teaching or introducing an activity, and directing students to develop process skills (Mardhia et al., 2022).

The construction aspects obtained a validity score of 4 with a very valid category (Riduwan, 2013). This assessment reviewing the linguistic elements used in the e-worksheet contains the style of language and effective sentences. The result has shown that the language and sentences used are under the General Guidelines for Indonesian Spelling (PUEBI), and the use of language adjusts the educational level of students (Fauziyah, 2017). It is supported by research by Ardiawan et al. (2015) that one of the crucial factors in preparing teaching materials is the use of language.

The assessment of the suitability aspect of E-worksheet for guided inquiry learning received an average validity score of 3.9 with a very valid category (Riduwan, 2013). This aspect has been reviewed based on the achievement of guided inquiry learning steps/syntaxes, including investigating a phenomenon, formulating problems, formulating hypotheses, planning investigations, conducting experiments, analyzing data and evidence, and concluding. This results indicate that activities in the e-worksheet suitable to the steps/syntax of guided inquiry learning and it is supported by the statement of Prastowo (2014), which states that worksheet must contain the steps needed by students in completing tasks/activities, and the activity steps are integrated with a learning model to guide students comprehension (Arafah et al., 2020).

The suitability of an e-worksheet with the achievement of indicators of students' science process skills is reviewed based on eight criteria. Based on the table above, the overall average validity score is 3.9 with a very valid category (Riduwan, 2013). This result indicates that the e-worksheet developed was feasible and valid in training students' science process skills through guided inquiry learning activities in e-worksheet. The result aligns with the statement of Astuti et al.

(2017), which states that a developed teaching material must facilitate the development of knowledge and skills of students.

The Implementation Result of E-Worksheet

The applicability of the developed e-worksheet is based on assessing students' activities through the E-worksheet and students' responses after learning using the e-worksheet.

Result of Student Activities using E-Worksheet

Assessment of student activity was carried out observationally by three observers, where each observer observes two groups. Students activities observed based on the implementation of features " Bio-Observe, Bio-Create, Bio-Thesis, Bio-Investigate, Bio-Try, Bio-Analyze, Bio-Conclude". Data on the results are obtained by calculating the number of students who carry out activities, namely the total score of all observers divided by the maximum score multiplied by 100%. The following is a recapitulation of the results of students' activities using e-worksheet, which shows in Figure 3:
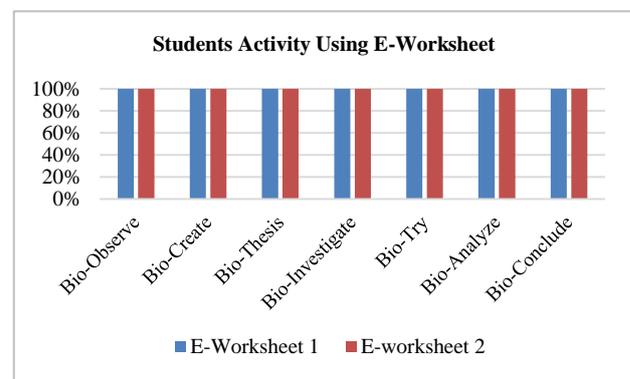

Figure 3. Students Activity through E-Worksheet Features

Based on the results, the average activity of students is 100%; this shows that all activities in the e-worksheet, both in the first e-worksheet or second e-worksheet, can be implemented very well. The implementation is according to the achievement of guided inquiry steps through features in the e-worksheet.

The "Bio-observe" feature in the E-LKPD guides students to observe the problems presented; this aligns with implementing the syntax of guided inquiry learning, "observing a phenomenon". Based on the trial implementation of this feature, students observed and analyzed related to the problem of garbage accumulation and the phenomenon of water pollution caused by detergent waste in the surrounding environment. Students suggest that in their environment, there was a problem of garbage accumulation in the market area, the river full of waste due to the construction of an overpass, and the accumulation of detergent waste that inhabits the river area. The result has shown that overall the "Bio-

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observe" feature was very well implemented and can guide students in conducting observation and analysis activities of surrounding problems.

The "Bio-create" feature guides students to formulating a problem in the current topic. This feature aligns with implementing the syntax of guided inquiry learning "formulating a problem". In the trial implementation, students in groups discussed the problem formulation related to eco-enzyme making in e-worksheet 1 and problem formulation activities related to using eco-enzyme to overcome water pollution due to detergents in e-worksheet 2 activities. The result has shown that the "Bio-Create" feature has been implemented well and has proven to guide and train students in developing problem formulation skills. Implementing this feature is the first step of investigation for students in linking and analyzing problems with the phenomena/concepts presented, and it can also train students' higher-order thinking skills. (Rusyadi, 2021).

The "Bio-Thesis" feature guides students in formulating hypotheses and it aligns with the guided inquiry learning syntax "formulating hypotheses." Based on Figure 3 above, the result has shown that all students carry out activities on the bio-thesis feature very well. In the trial implementation, students can formulate the possibilities that occur and connect the links related to the formulation of the problem formulated with the preparation of H1 and H0 experiments. Formulating hypotheses is one of the scientific method steps that require students to reason and estimate answers to problems based on relevant theories. The implementation of this feature is 100%, it indicates that formulating hypotheses can be trained through activities in the "Bio-Thesis" feature that integrated with activities based on guided inquiry. The result aligns with the research by Andri et al. (2013) which showed an increase in students' ability to reason and predict through guided inquiry-based learning.

The "Bio-investigate" feature guides students to conduct investigations related to experimental planning. This feature aligns with the guided inquiry syntax "planning investigations." Students identify and define variables in this feature and then design the experiment stages. The implementation of this feature is 100%; it indicates that the bio-investigate feature can direct students in prepared variables and designed experiments.

The "Bio-Try" feature guides students in conducting experimental activities based on the guided inquiry learning syntax "experiment". The implementation of this feature is 100%; it indicates that all students did the part of the experiment's stage clearly. All students can carry out the stages of making coenzymes on e-

worksheet 1 with data results in the form of changes in pH and fungal appearance in coenzyme products made by students. In the e-worksheet 2, all students can carry out all stages of the coenzyme effectiveness test experiment on detergent waste with data results in the form of changes in color and pH in the treatment carried out. These results have shown that activities through "Bio-Try" can direct students' activeness in finding concepts independently through practical steps. This experimental activity can provide a meaningful learning experience to develop a scientific attitude for students (Darmiyati, 2020).

The "Bio-Analyze" feature guides students in analyzing the data from the experiments conducted. This feature aligns with the guided inquiry learning syntax "analyzing data". The implementation of this feature was 100%; it indicates that all students did every part of this activity clearly. In this feature, students were guided through analyzing the experimental data through questions that make it easier for students to understand and describe the relationship between the data obtained. (Jumini et al., 2020).

The "Bio-Conclude" feature guides students in drawing conclusions based on the results of the experimental data analysis and it aligns with the guided inquiry learning syntax "conclude". Concluding skills are one of the skills that play an essential role in processing the knowledge received by students. Implementing this feature also proves that students have been able to answer research problems and prove research hypotheses, compile and interpret (quantitative) data descriptively and inferentially, and produce conclusions to make it easier for readers to understand the research results (Jufri, 2018)

The average implementation of features in the e-worksheet got a percentage of 100% which indicates that the entire process of activities in guided inquiry learning has been able to be mastered by all students through the achievement of these features. The result is related to the statement of Liniarti et al. (2013), which states that the involvement of students in the guided inquiry learning process is associated with the process of investigation, discussion, expressing opinions, and skills in building the knowledge gained.

Results of Students' Response to E-Worksheet

The implementation of students is also according to the assessment of students' responses to developed e-worksheet. This student response is related to aspects of the use and appearance of the e-worksheet, aspects of learning through guided inquiry, and aspects of the achievement of science process skills obtained after

learning using the e-worksheet. The results of the recapitulation of students' responses can show in Table 9:

Table 9. Recapitulation of Students' Responses to the E-Worksheet

No.	Criteria	Σ Positive Response	Percentage (%)
Criteria of E-Worksheet			
1	The appearance of the e-worksheet cover is attractive	25	100 %
2	E-Worksheet can easily operate	25	100 %
3	E-Worksheet is easy to access anytime and anywhere	25	100 %
4	E-Worksheet can be flipped through easily	25	100 %
5	The instructions in the e-worksheet are clear and easy to understand	24	96 %
6	The design and layout of the e-worksheet are exciting and easy to understand	25	100 %
7	The color combination of the whole e-worksheet is appropriate	25	100 %
8	The writing in the e-worksheet can be read clearly	25	100 %
9	The font type and size are appropriate and easy to read	25	100 %
10	The images presented are clear and illustrate the content of the material	25	100 %
11	The website page presented can be easily accessed	25	100 %
12	Video content in the form of links can be clicked directly to Youtube as a reference source.	25	100 %
13	The use of language in e-worksheet is easy to understand	23	92 %
14	The material presented is explicit and easy to understand	25	100 %
15	Features in e-worksheet help in understanding learning steps	24	96 %
The Average Score of E-Worksheet Criteria		**98,9 % (Very Positive)**	
Guided Inquiry Aspect			
16	The "Bio-observe" activity in the e-worksheet can stimulate me to make observations of environmental problems.	25	100 %
17	The "Bio-Create" activity on e-worksheet can help me to formulate problems	25	100 %
18	The "Bio-thesis" activity can stimulate me to formulate hypothesis according to the formulation problems that has been prepared	24	96 %
19	The "Bio-investigate" activity can direct me in preparing the experimental variables and the design that will be carried out.	23	92 %

No.	Criteria	Σ Positive	Percentage
20	The "Bio-Try" activity can direct me in conducting experiments properly and correctly.	25	100 %
21	The "Bio-Analyze" activity can encourage me to analyze the experimental findings through the questions presented.	25	100 %
22	The "Bio-conclude" activity can make it easier to link the problem with the results obtained through experiments and guide me in making conclusions.	25	100 %
The Average Score of Guided Inquiry Aspects		**98,2 % (Very Positive)**	
Aspects of Science Process Skills			
23	I can formulate the problem properly and correctly through the activities in the e-worksheet	25	100 %
24	I can formulate a hypothesis based on the formulation of the problem made properly and correctly through the activities in the e-worksheet	25	100 %
25	I can identify research variables well through the investigation activities in the e-worksheet	24	96 %
26	I can explain and define the research variables involved well	24	96 %
27	I can experiment well and smoothly	25	100 %
28	I can interpret and analyze the data from the experiments	25	100 %
29	I can draw conclusions related to the problem with the experimental results that have been obtained	25	100 %
30	Overall, this guided inquiry-based e-worksheet can train science process skills well.	25	100 %
The Average of Science Process Skill Aspect		**99 % (Very Positive)**	
The Final Average of Students' Responses		**98,7 % (Very Positive)**	

Based on the results of students' responses in the table above, the overall average percentage of students' responses to the e-worksheet was 98.7%. The result indicates that the e-worksheet developed received a very positive response from students.

The aspect of e-worksheet criteria reviews the student responses to the appearance, use, language, and features of the e-worksheet. The result has shown that in this aspect, it got a very positive response with a percentage of 98.9%. The result shows that over all the e-worksheet developed can attract the attention and increase the interest of students in participating in learning so that the purpose of using this e-worksheet is appropriate and achieved in terms of increasing motivation and building

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learning experiences for students (Servitri & Trisnawaty, 2018).

The aspect of guided inquiry reviews the students' responses to implementing guided inquiry integrated with e-worksheet features in learning activity. The response results were very good, with an average score of 98.2%, with a very positive category. The result shows that the guided inquiry-based features in e-worksheet can facilitate students in analyzing and discovering their knowledge independently based on science work through inquiry-based activities. It aligns with the statement of Servitri & Trisnawaty (2018) which states that the inquiry learning process allows students to apply self-discovery. In this case, students acquire skills that can apply to their lives and provide opportunities for students to understand in-depth science concepts so that the learning process will be more meaningful.

The aspect of science process skills, students' response to the achievement of indicators on science process skills trained using e-worksheet. The response results were very good, obtaining an average score of 99% with a very positive category. The result has shown that through e-worksheet activities equipped with guided inquiry-based features, students have been able and have the science process skills to find and analyze a problem using the scientific method independently. The acquisition of this very positive response strengthens the value of the e-worksheet developed. An e-worksheet product must contain activities that facilitate students in achieving the specified objectives. It aligns with the statement of Astuti et al. (2018), which states that the advantages of teaching material are facilitating students in showing their ability to improve thinking process skills through puzzle-solving activities by searching, speculating, and even reasoning.

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CLOSING
Conclusion

Based on the results, it can be concluded that an e-worksheet based on guided inquiry of environmental change material developed to train science process skills

is theoretically valid based on the result of validation with average validity score of 3.8 with a very valid category. The implementation of the e-worksheet in terms of the results of student activities can be implemented very well with an average score of 100% then based on the results of student responses obtained a very positive response with a percentage of 98.7%.

Suggestion

Based on the research, it should be necessary to do the dissemination stage more thoroughly to be used as a learning innovation and reference in developing an e-worksheet on other topics.

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