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THE DEVELOPMENT OF STUDENT WORKSHEET TO TRAIN CRITICAL THINKING SKILL IN ACID BASE MATTER FOR SENIOR HIGH SCHOOL IN 11th GRADE

Dewi Aisyah and *Bertha Yonata
Chemistry Department, Mathematics and Natural Science Faculty, Universitas Negeri Surabaya
***Email:** berthayonata@unesa.ac.id

Abstract

This study aimed to produce appropriate student worksheet used as a teaching material to train critical thinking skill of acid-base matter that are reviewed from content validity and constructs through the results of validation by experts, practicality through student activities and student responses, and effectiveness through critical thinking skills and learning outcomes of student. The type of this research is the development of Research and Development (R&D) models which are limited to reaching the product trial stage. The student worksheet was tested on 12 students of 11th grade at SMAN 1 Sumberrejo Bojonegoro. Based on the research data obtained, student worksheet to train student critical thinking skills in acid-base matter developed is feasible to use, in terms of validity, practicality, and effectiveness. The results showed that the developed student worksheet was valid in terms of content validity, obtained a percentage of 91.99% and construct validity consisting of presentation criteria obtained a percentage of 88.37%, linguistic criteria obtained a percentage of 85.79%, and graphics criteria obtained a percentage amounting to 88.45%. student worksheet is practical in terms of observations of the activities of students during the testing phase of the student worksheet with a percentage of 96.36% and responses of students to each criterion namely the content criteria of 94.45%, presentation criteria 91.67%, linguistic criteria 91.67%, graphics criteria 97.23%. Effectiveness of student worksheet in terms of indicators of critical thinking skills consisting of interpretations obtained a percentage of 89.72% in the high category, analysis obtained a percentage of 86.17% in the high category, and inference obtained a percentage of 92.92% in the very high category. Increasing the results of the assessment of critical thinking skills through the n-gain score of 16.67% increased with medium category and 83.33% with high category, and the knowledge learning outcomes of students 100% scored above the KKM set at SMAN 1 Sumberrejo, namely $\geq$75.

Keywords: Student Worksheet, Critical Thinking Skills, Feasibility, Acid Base.

INTRODUCTION

According to Permendikbud Number 69 of 2013 states that the 2013 curriculum is a curriculum compared to perfecting the passive learning process into active-seeking learning. The learning of active students looking for is further strengthened by the science approach learning model. 2013 curriculum has characteristics to develop attitudes, knowledge, and skills and apply them in various situations in schools and society. Skills can be obtained through activities of observing, asking, trying, reasoning, presenting, and creating [1].

Chemistry is a part of science that seeks answers to the questions of what, why and how natural phenomena are related to the composition, structure, and energy that accompany material changes. Chemistry is the study of matter and its changes. Elements and compounds are substances that are involved in chemical changes [3]. Based on the 2013 curriculum, solution material is the subject matter for senior high school in 11th grade which has basic competencies explaining the concepts of acids and bases and their strengths and ionizing equilibrium in solution and analyzing the pH change route of several indicators extracted from natural ingredients through experiments. This material is very suitable to be developed with inquiry learning models because concepts that are not merely memorized but also require an exploration through practical activities that can train students to be able to formulate their own concepts on the material being studied [2]. Even until recently, several studies have been documented that refer to alternative conceptions of acids and bases that students and teachers have [3].

Based on Permendikbud Number 23 of 2006 concerning the purpose of the Competency Standards PT Satuan Pendidikan (SKL-SP) for

senior high school, students must demonstrate the ability to think logically, critically, creatively and innovatively in decision making. Critical thinking is referred to as one of the future competencies that must be possessed by students. Critical thinking is reflective and reasoned thinking is focused on making decisions to solve problems. Critical thinking is divided into three stages and there are six major skills involved. These skills are interpretation, analysis, evaluation, interference, explanation and self-regulation [4].

One effort to train critical thinking by choosing a learning model involves students actively, and requires students to think critically. An alternative that can be used to train critical thinking skills guided by inquiry learning models. The inquiry learning model is a learning process approach that involves students to find and use various sources to gain an understanding of the problem [5]. The inquiry learning model is learning that emphasizes the importance of helping students understand the structure or key ideas of a scientific discipline so that students are actively involved in the actual learning and learning process [6]. One model of inquiry learning is guided inquiry. The role of students in guided inquiry learning is to find and find out for themselves the subject matter, while the teacher acts as a facilitator and mentor for students to learn [7].

After analyzing Basic Competence so that several indicators emerge and pay attention to the characteristics of each sub-chapter of acid-base material, it does not only use inquiry models, but can also use the deductive learning, guided discovery, and direct instruction models. Viewed from sub material that has different characteristics.

Based on the results of interviews with chemistry teachers at SMAN 1 Sumberrejo, learning in schools is still not in accordance with 2013 learning even though there have been implemented the 2013 curriculum. Therefore teachers still tend to explain learning materials so that students tend to only accept material from the teacher not through the process discovery of themselves. Some learning methods that are often used in the learning process are lecture learning methods and discussions. So, students still tend to use teacher-centered learning.

According to Permendikbud Number 59 of 2014 states that the learning process requires effective and efficient media to channel messages that can stimulate thoughts, attention, and willingness to learn. Student worksheet is one of the visual learning media. Student worksheet allows students to participate in the learning process actively and improve student achievement, so that the existence of student worksheet can give a considerable influence. In addition, student worksheet can also facilitate students to understand the material provided [8].

The availability of facilities and infrastructure to support learning success is sometimes not sufficient to carry out the learning process independently. Student worksheet is a means of supporting the success of chemical learning. The existing student worksheet is only a brief explanation using textual descriptions and workflows so that students are unable to construct chemical materials and equipment that were originally considered abstract. Student worksheet for existing chemistry practicums is only available in textbooks, modules or dictates only [9].

These things are reinforced by the results of pre-research conducted at SMAN 1 Sumberrejo Bojonegoro. The results of the questionnaire obtained from 34 students showed an interest in learning chemistry by 88%. Based on the results of teacher interviews, chemistry learning in schools uses the method of discussion and lecture, which makes learning not in line with national education goals. It is known that practicum that rarely uses inquiry/discovery models is that students find concepts constructively. From the interview results of the chemistry teacher of SMAN 1 Sumberrejo relating to critical thinking skills, for acid-base material students have been trained in critical thinking skills but are still low.

This is evidenced by the results of tests of critical thinking skills on several components with results for interpretation of 21.4%, analysis of 19.12% and inference of 17.65%. This was also supported by previous research, stating that when pre-research was conducted students could not answer correctly when presented with phenomena and some questions according to critical thinking skills. This can be seen from the percentage of students' thinking ability in the aspect of focusing questions 12%, analyzing aspects of the argument 20%, and making conclusions based on facts 28% [10]. Therefore, it is necessary to conduct a study entitled "The Development of Student Worksheet to Train Critical Thinking Skill In Acid Base Matter for Senion High School in 11th Grade" which is

expected to help students understand acid-base material to be more meaningful and train critical thinking skills learners.

METHOD

This type of research is research and development using the R&D method. The model for developing R&D devices is suggested by Sugiyono. This research develops student worksheets to train critical thinking skills of 11th grade senior high school about acid base matter. The source of research data was obtained from the opinions of experts and students of 11th grade SMAN 1 Sumberrejo Bojonegoro.

Validators provide input and suggestions by filling in the review sheet. Then give an assessment score in the range 0-5 on the validation sheet. Evaluation of validity is seen from the content and construct criteria. The percentage of data used the Likert rating scale calculation in Table 1.

Table 1. Likert Scale

Category	Scale
Very appropriate	5
Appropriate	4
Appropriate enough	3
Less appropriate	2
Verry less appropriate	1
Not appropriate	0

[11]

The validity of student worksheet is calculated using a formula:

$$\% = \frac{Total\ score\ of\ data\ collection}{criteria\ score} x\ 100\%$$

The percentage of data scores from the validation results was determined using a Likert Scale. The results of the assessment of the validity scores that have been obtained are interpreted using the development validity criteria as in Table 2.

Table 2. Criteria for Interpretation of Validation Sheet Scores and Student Responses

Percentage (%)	Category
0 – 20	Invalid/Unpractice
21 – 40	Less valid/Less practice
41 – 60	Valid enough/Practice enough
61 – 80	valid/Practice
81 – 100	Highly valid/Very practice

[11]

Based on the interpretation criteria of the score, the developed student worksheet can be said to be valid if the aspects of content validity and construct validity get a percentage of ≥61% [11].

The student worksheet trial phase developed was conducted on 12 students of 11th grade at SMAN 1 Sumberrejo Bojonegoro. At the trial stage, it was conducted to determine the practicality and effectiveness of the developed student worksheet. Practicality is analyzed through response data and observation of student activities. The data from the responses of students is calculated based on the Guttman scale as in Table 3.

Table 3. Guttman Scale

Answer	Positive Answer Score	Negative Answer Score
Yes	1	0
No	0	1

[11]

The response data of students obtained is calculated as a percentage using the following formula:

$$\% = \frac{Total\ score\ of\ data\ collection}{criteria\ score} x\ 100\%$$

Based on the results of the questionnaire response analysis obtained and then interpreted in 5 response criteria, which are found in Table 2.

Based on these criteria, the student worksheet to train critical thinking skills in the senior high school 11th grade of acid-base matter were stated to be practice if they obtained an assessment percentage of ≥61% [11].

Observation of the activities of students aims to determine the activities of students during a limited trial of the student worksheet that has been developed. Observation of student activities was carried out by three observers during a limited trial. Activities are said to be well implemented and support the practicality of developing student worksheet in training critical thinking skills if the percentage of relevant student activities is greater than the percentage of irrelevant student activity.

Effectiveness was analyzed through the results of critical thinking skills and student knowladge learning outcomes at the pretest and posttest. Analysis of test data for critical thinking skills of students in accordance with the rubric that has been made. Where tests of critical thinking skills include interpretation, analysis, and inference.

Each indicator of critical thinking is calculated using the following formula:

$$\%\ Characteristic\ of\ critical\ thinking = \frac{Score\ that\ got}{Maximal\ score} x\ 100\%$$

The percentage of each characteristic of critical thinking is then interpreted according to the following Table 4.

Table 4. Score Criteria for Critical Thinking Skills

Percentage (%)	Category
0 – 30	Very low
31 – 54	Low
55 – 74	Normal
75 – 89	High
90 – 100	Very High

[12]

Based on these category, each component of critical thinking can be said to be successfully trained if the percentage is ≥75% or in the high category.

Differences in critical thinking skills of students before (pretest) and after (posttest) were used by student worksheet which were analyzed by calculating using the n-gain score which had previously been tested for Normality using SPSS.

To calculate the n-gain score the equation is used as follows:

$$g = \frac{Posttest\ score - Pretest\ score}{Maximal\ score - Pretest\ score}$$

Score that got is interpreted using Table 5.

Table 5. N-Gain score Interpretation Criteria

<g> Score	Category
<g> ≥ 0,7	High
0,7 > <g> ≥ 0,3	Medium
<g> < 0,3	Less

[13]

Whereas for data supporting the effectiveness of student worksheet on knowladge learning outcomes students use the completeness of individual learners. To determine the learning completeness of students (individuals) can be calculated using the following formula:

$$Mastery\ learning = \frac{Total\ Score\ that\ got}{Maximal\ score} x100\%$$

In accordance with the established KKM, the completeness of the individual is said to be complete if the proportion of participants' answers is ≥75 [14].

RESULT AND DISCUSSION

After analyzing Basic Competence so that several indicators appeared and paid attention to the characteristics of each sub-matter of acid-base, the student worksheet developed using 4 different learning models, namely deductive learning model on student worksheet 1, guided discovery on student worksheet 2 and 3, guided inquiry on student worksheet 4 and direct instruction on student worksheet 5. Viewed from sub-matter that has different characteristics.

The Validity of Student Worksheet

Worksheet validity is determine the assessment of experts on the feasibility of the developed student worksheet. There are two validated criteria including content validity and construct validity. From the results of the assessment that has been carried out by three validators, the percentage shown in Table 6.

Table 6. Validation Data Results

No	Validated criteria	Percen-tage	Category
1	Content	91,99%	Highly Valid
2	Presentation	88,37%	Highly Valid
3	Linguistic	85,79%	Highly Valid
4	Graphics	88,45%	Highly Valid

In Table 6 shows that the student worksheet presented has been valid to train critical thinking skills according to Riduwan's adaptation score table [11]. In content validity there are three aspects, namely the suitability of the material with the curriculum, the suitability of the substance of the learning material, and the suitability of the student worksheet with critical thinking skills. These results indicate that the developed student worksheet meets the feasibility criteria with a percentage of ≥61%. This is because at one stage of the development of R&D, namely the stage of data collection carried out curriculum analysis, students, assignments, concepts and indicator specifications [15]. So that the basic competencies, indicators and acid-base material contained in the student worksheet are in accordance with the 2013 Curriculum. Then serve as the basis for the preparation of the

student worksheet to train students critical thinking skills in acid-base matter.

Construct validity has three criteria, namely criteria for presentation, linguistics, and graphics. From these results it also shows that the developed student worksheet meets the feasibility criteria because it gets a percentage on all aspects of ≥61%. The presentation criteria contain several aspects of the assessment, including the cover presenting the contents of the student worksheet, the problems presented evoke enthusiasm for learning, there is a place to write answers according to needs, presentation of illustrations or relevant images with the main material seen in the features, complete components presented in the student worksheet, and suitability of student worksheet with display.

The validator will assess the language used in writing the student worksheet to train students critical thinking skills in acid-base material. Language criteria contain several aspects of assessment, including using good and correct Indonesian, the language used in accordance with the abilities of students, and using language that is easy to understand. but the linguistic criteria have the lowest percentage value compared to the other criteria. this is because there are several languages that are still not correct, so the validator gives suggestions for improvement. for example the learning indicator only uses one operational word.

Graphics criteria contain several aspects of assessment, including the use of the font (type and size) is correct, the layout and layout are appropriate, and the design of the student worksheet display.

The results of validity obtained based on the criteria of content validity and construct for each criterion in worksheet 1, worksheet 2, worksheet 3, worksheet 4 and worksheet 5 get ≥61% with a highly valid category. This is relevant with the results of previous studies that student worksheet on acid base matter based on chemistry representation and chemistry literacy to train student critical thinking skill has met the validity criteria with the results of highly valid category.

The Practicality of Student Worksheet

The practicality of the developed student worksheet is known through the results of student questionnaire responses and observations of student activities. The activities of students are obtained from observations of student activities carried out by 3 observers during the learning process. Whereas for the student questionnaire the response was disseminated and filled out by students after the learning process using the developed student worksheet. Data on the overall response of students obtained a percentage of 93.76% with a very practical category. This shows that the student worksheet developed was very practical from the responses of students who had a percentage of ≥61%. The results of student responses can be seen in Table 7.

Table 7. Data on the Results of the Response of Students

No	Aspect	Percenta-ge	Category
1	Content	94,45%	Very Practice
2	Presentation	91,67%	Very Practice
3	Linguistic	91,67%	Very Practice
4	Graphics	97,23%	Very Practice

In Table 7, it can be seen that the developed student worksheet scores very well on the content criteria. This means that student worksheet is developed according to the content assessment criteria in the component of critical thinking skills [16]. The construct criteria consist of presentation, linguistic, and graphics. The presentation criteria also get a very practice percentage. This is in appropriate with the assessment criteria for the presentation component, one of which is assessed based on the order of presentation [16].

The presentation criteria include several questions, for example such as the presentation of student worksheet motivating to learn acid-base matter to get a percentage of 100%. An interesting presentation of student worksheet can increase students interest and motivation [17]. The linguistic criteria get an overall percentage of 91.67% and in the very practice category. Linguistic criteria really determine whether acid-base matter contained in the student worksheet is easy for students to understand or not. With uncomplicated language and easy to understand terms, the acid-base matter is easy for students to understand and does not make students misinterpretation and cause misunderstandings. Feasibility of language in terms of effective and efficient language use [16]. The graphics criteria get a percentage of 97.23% and the very practice category. Graphics criteria were assessed on the student response questionnaire in terms of the appearance of the

atudent worksheet in terms of layout, font, and color alignment [16].

The presentation criteria, the average percentage obtained has a lower value compared to the criteria of content and graphics even though it is already in a very practice category. This is because according to students the illustrations/images in the student worksheet are still not appropriate. So that you get a lower percentage compared to the other criteria. The linguistic criteria also get a lower average percentage compared to the criteria of content and graphics even though they are already in a very practice category. This is because according to students the language used in student worksheet is still too complicated to understand, so the percentage obtained is lower than the other criteria.

Based on observational data on student activities it is known that during the limited trial activities using student worksheet to train critical thinking skills obtained relevant activities of students with an average percentage in the trials of worksheet 1, worksheet 2, worksheet 3, worksheet 4, and worksheet 5 which amounted to 96.36% and it can be seen that during the limited student worksheet trials to train students critical thinking skills in acid-base matter the percentage of students relevant activities was greater than the activities of irrelevant students. The results of observing student activities can be seen in Table 8.

Table 8. Results of Student Activity Observations

No	Meeting	Percentage (%)	
		Relevant	Irrelevant
1	Trials student worksheet 1	94.63	5.37
2	Trials student worksheet 2	95.60	4.40
3	Trials student worksheet 3	96.67	3.33
4	Trials student worksheet 4	97.15	2.85
5	Trials student worksheet 5	97.73	2.27

Based on the data in Table 8, it can be seen that during the limited student worksheet trials to train students critical thinking skills in acid-base matter the percentage of students relevant activities was greater than the activities of irrelevant students. This shows that students are enthusiastic and interested in the student worksheet developed and show that the student worksheet is practical because the percentage of relevant student activities is greater than irrelevant activities.

The Effectiveness of Student Worksheet

The effectiveness of the developed student worksheet is obtained from the value of each component of critical thinking skills, increasing the results of the assessment of critical thinking skills and knowledge learning outcomes of students. Each component of critical thinking can be said to be successfully trained if the percentage is ≥75% in the high category. Improved critical thinking skills were obtained from the pretest carried out before learning with the student worksheet and posttest conducted after learning using the student worksheet. Critical thinking can be enhanced by learning involving discussions and tasks that are mutually interrelated [18]. Therefore, teachers must be interested in choosing and determining the learning model used, so that the implementation of learning can be carried out effectively and efficiently [19].

The increase in the results of the pretest and posttest was then analyzed using the n-gain criteria that had been normalized first. Student worksheet is declared effective if as many students as participating in the trial are limited to getting n-gain ≥0.3 in medium categories. Assessment of knowledge learning outcomes is obtained from the posttest value adjusted for the KKM specified, then the completeness of the individual is said to be complete if the proportion of participants correct answers is ≥75.

From the results of the test the critical thinking skills test consists of the pretest and posttest scores. Before determining the n-gain score from the test result data, a normality test is needed to determine that the data for the n-gain value has been normally distributed. After the learning process using the developed student worksheet, students are then given posttest questions to find out the improvement in the students critical thinking skills after learning using the developed student worksheet. There are 10 pretest-posttest questions in the form of critical thinking description questions. The results of the pretest-posttest on the description question are then tested for normality to determine that the data obtained has been normally distributed. The increase in the results

of the assessment of critical thinking skills can be seen in Table 9.

Table 9. Improved Results Assessment of Critical Thinking Skills

No	Student	Pre-test	Post-test	Gain	Category
1	S 1	55	96	0.9	High
2	S 2	37	88	0.8	High
3	S 3	48	95	0.9	High
4	S 4	33	84	0.7	High
5	S 5	36	96	0.9	High
6	S 6	25	82	0.7	High
7	S 7	51	82	0.6	Medium
8	S 8	47	87	0.7	High
9	S 9	51	82	0.8	High
10	S 10	47	79	0.6	Medium
11	S 11	49	96	0.9	High
12	S 12	36	86	0.7	High

Based on the results of the pretest and posttest that have been tested and stated to be normally distributed, then the n-gain value is calculated to determine the increase in the results of assessment of students critical thinking skills after learning using the developed student worksheet. Of the 12 students who were tested with student worksheet 16.67% experienced an increase with medium category and 83.33% with high criteria. Based on the results of the assessment of critical thinking skills, it can be seen that the developed student worksheet are declared effective to be used as teaching materials with the increase obtained by students getting n-gain ≥0.3 with medium categoriy and n-gain ≥0.7 in the high category. This is also supported by previous research, which states that students have completed tests of critical thinking skills with n-gain scores obtained in the range of 0.3-0.8 in medium to high categories [20].

The results of the assessment of the components of critical thinking skills can be seen in Table 10.

Table 10. Test Results for Critical Thinking Skills for Each Component

No	Indicator of critical thinking skills	Average percentage (%) and category	
		Pretest	Postest
1	Interpretation	48.89 (Low)	89.72 (High)
2	Analysis	42.66 (Low)	86.17 (High)
3	Inference	42.09 (Low)	92.92 (Very high)

Based on the results of the pretest and posttest that have been tested, each component of critical thinking can be said to be successfully trained if the percentage is ≥ 75% or in the high category. In the analysis indicator the average percentage is the smallest when compared to the indicators of interpretation and inference even though it is already in the high category according to the criteria of critical thinking skills score [12]. This is because, during the process of analyzing students have difficulty in identifying objectives in real terms and linking statements, questions, concepts, descriptions, or other representations to express reasons, information, and opinions. This is supported by previous research stating that the developed student worksheet can train critical thinking skills on the interpretation indicator to obtain results of 87.75%, analysis of 86.43%, and inference of 87.53% [21].

In the inference indicator, the percentage of pretest obtained is the smallest compared to the other indicators which is equal to 42.09%, but the highest posttest results are obtained. This is supported by the results of the pre-research test of critical thinking skills in the inference indicator obtained the smallest percentage of 17.65%. Because before students get on the developed studen worksheet, they do not yet know how to make conclusions by identifying and acquiring the elements needed to make reasonable conclusions [22].

Effectiveness is also seen from the value of student knowledge learning outcomes in the posttest using the completeness of individual learners. Improving student learning outcomes can be seen in Table 11.

Table 11. Knowledge Learning Outcomes

No	Student	Incorrect answer	Correct answer	Score
1	S 1	0	10	100
2	S 2	2	8	80
3	S 3	1	9	90
4	S 4	2	8	80
5	S 5	2	8	80
6	S 6	2	8	80
7	S 7	2	8	80
8	S 8	0	10	100
9	S 9	1	9	90
10	S 10	1	9	90
11	S 11	0	10	100
12	S 12	2	8	80

Based on Table 11, it can be seen that all students scored above the KKM set at SMAN 1

Sumberrejo, which is ≥75. So it can be concluded that student worksheet to train students critical thinking skills in acid-base matter developed meets the effectiveness criteria. There are different levels of difficulty in the items, can be seen from the many whether the correct answers from students. Question making is based on the question indicator. There are four indicators of the question that must be achieved by students in knowledge learning outcomes, including analyzing the concept of acid base according to the theory of experts, analyzing the nature of the solution using artificial acid base indicators, analyzing the nature of acid base solutions using natural indicators, and analyzing the strength of acid base based on changes in the pH of the solution.

Of the four indicators, the first indicator has been reached, indicated by all students correctly answering questions number 1 and 2. While the other three indicators are not yet achieved because there are some students who answer incorrectly. But when viewed from the value of individual completeness, all students get a score of ≥75.

CLOSURE

Conclusion

Based on the suitability between the results of the research and problem formulation and data analysis, it can be concluded that the student worksheet to train critical thinking skills of acid-base material is appropriate to use as teaching material in the class with the following details:

1. Student worksheets to train critical thinking skills of acid-base matter is stated to be valid used as teaching materials based on the results of the validator's assessment. The value of validity obtained in the category is highly valid, but linguistic criteria get the lowest percentage compared to the other criteria while the content criteria get the highest percentage.
2. Student worksheet to train critical thinking skills of acid-base matter is stated to be practically used as teaching material which is viewed from the responses of students and observation of the activities of students. The results of student responses on all criteria get a percentage in the very practical category. presentation and linguistic criteria get the lowest percentage compared to the other criteria. The percentage of relevant student activities increases in each student worksheet trial with the percentage of relevant activities greater than irrelevant activities.
3. Student worksheet to train critical thinking skills of acid-base matter is stated to be effective used as teaching material in terms of critical thinking skills and student knowledge learning outcomes. The results of the assessment of critical thinking components obtain a percentage in the high and very high categories. The analysis criteria get the lowest percentage compared to the criteria of interpretation and inference. The results of the assessment of critical thinking skills meet the criteria, namely increasing with the criteria of 7 0.7 with high criteria of 83.33% and 3 0.3 with sufficient criteria of 16.67%. As well as the students' learning achievement scores above the KKM set at Sumberrejo 1 Public High School, which is> 75.
4. After analyzing Basic Competence, several indicators emerge and pay attention to the characteristics of each sub-matter of acid-base material, so that 5 student worksheets are developed using 4 different models, namely the model of deductive learning, guided discovery, guiderd inquiry and direct instruction. Viewed from sub-matter that has different characteristics

Suggestion

1. Student Worksheet to train critical thinking skills of acid-base material developed using Sugioyono's Design and Development / R & D design only until the trial phase is limited. Therefore, it is necessary to conduct research until the stage of mass production by applying the LKPD that has been developed in the classroom or school with a greater number of students.
2. In the results of validation, linguistic criteria have a lower percentage than other criteria, so it needs improvement in the use of a more appropriate language. on the results of the students' responses, the presentation criteria and linguistic criteria also get a lower percentage compared to the criteria of content and graphics so that need to be corrected.
3. In the learning process using the student worksheet to train critical thinking

skills, the analysis indicator gets a lower percentage compared to the indicators of interpretation and inference. This is because students are still having difficulty in identifying goals in real terms and connecting statements, questions, concepts, descriptions, or other representations to express reasons, information, and opinions. So that there is still a need to discuss more on the low indicator.

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