

THE DEVELOPMENT OF STUDENTS' ACTIVITY SHEET WITH GUIDED INQUIRY ORIENTATION TO TRAIN CRITICAL THINKING SKILL OF INCLUSIVE STUDENTS IN SUB MATERIALS FACTORS THAT AFFECTING REACTION RATE

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Abstract

This study aims to determine the validity of The Development of Students' Activity Sheet with Guided Inquiry Orientation to Train Critical Thinking Skill of Inclusive Students in Sub Materials Factors That Affecting the Reaction Rate. The validity of the developed Students' Activity Sheet is based on internal validity and external validity. Internal validity is reviewed from the validation result. External validity is reviewed from student responses after using Guided Inquiry-based Activity sheet to Train the Critical Thinking Skills of Inclusive Students on Sub Material Factors that Affecting Reaction Rate that developed. This research uses R & D method, but only applied until development stage. Judging from the validation result, student worksheet based on content criteria of 85.07%, 80.83% on presentation content and 83.33% on the language content. Judging from the results of student responses, the feasibility of Students' Activity Sheet based on content criteria is 100%, 100% of presentation and language of 97.21%. Judging from the pretest and posttest results obtained classical completeness of 87.5% calculated from completeness of classical pretest of 12.5% and classical posttest of 100%.

Keywords: Students' Activity Sheet, guided inquiry, critical thinking skill, inclusive.

INTRODUCTION

Education for students with special needs that have been implemented is to establish an *Sekolah Luar Biasa (SLB)* which is divided into *SLB* for the blind, *SLB* for deaf and mute, *SLB* for retarded. This means students with special needs different school or separated from normal students. Special education that we are referred to is special education held on an inclusive basis or in a special education unit. The realization of Law No. 20 year 2003 began in 2001 of the Directorate of Special Education instructed to all districts to develop inclusive schools in elementary, junior high, high school, and vocational schools at least one. Inclusive education provides a broad opportunity for students with special needs to obtain qualified education based on their needs and abilities and learn together with normal students in inclusive schools [1]. The treatment of each type of disability of course vary. Because each type of disability has different characteristics, including the hearing impairing. Students with special needs are said to be hearing impaired if they have trouble with hearing system. As a result will appear some disorders, especially in the development of speech and language [2].

One alternative that can be used to help deaf students in studying chemistry is to develop a

learning device that suits the needs of deaf students to ease their understanding of chemistry subject. One learning resource that can be developed is the Students' Activity Sheet [3]. Each subject requires Students' Activity Sheet to support the learning. However, the availability of Students' Activity Sheet on the market does not refer to the current curriculum, which is Curriculum 2013. The developed Students' Activity Sheet oriented with guided inquiry to train student's critical thinking skills, the use of this strategy is expected to solve more complex problems or related to the experiment.

To generate student's critical thinking skill, an approach is required to create meaningful learning through student's activity sheet. The approach that we referred to is inquiry. The inquiry approach is a process for obtaining information by doing observations and/or experiments to find answers or solving problems with questions or problem formulations using critical and logical thinking skills [4]. Concept of critical thinking primarily based on special skills such as observing, guessing, generalizing, reasoning and evaluating reasoning [5].

Based on the interview that have been conducted to two chemistry teacher of inclusive school in *SMAN 10 Surabaya* and *SMAN 1 Gedangan*, Sidoarjo stated that students have

difficulties in understanding reaction rate material, so that "The Development of Students' Activity Sheet with Guided Inquiry Orientation to Train Critical Thinking Skill of Inclusive Students in Sub Materials Factors That Affecting the Reaction Rate" will be done.

METHOD

This type of research is a research and development (R & D). Research and development is the method used to research and produce new products, and then examine the effectiveness of these products [6]. This research is the development of Students Activity Sheet containing experiments and tasks that suitable with the material. After the Students' Activity Sheet is examined and declared valid then it will be applied by student to gain response.

Analysis that used in this research are:

1. Analysis of Review
Review data from chemistry lecturers, SLB teachers, and chemistry teachers teaching in inclusive classes toward the developed Students' Activity Sheet were analyzed descriptively then implemented in revisions or improvements before validation to determine internal validity.
2. Analysis of validation
Data obtained from expert assessment sheet to Students' Activity Sheet based on contents, linguistic and presentation criteria that developed used to determine the validity of Students' Activity Sheet quantitatively using percentage calculation. The percentage of questionnaire data was obtained based on Likert scale score calculation on Table 1.

Table 1 Likert Scale

Category	Value Scale
Very appropriate	5
appropriate	4
Enough appropriate	3
Less appropriate	2
Not appropriate	1

The data obtained then calculated by using the formula:

$$\% = \frac{\text{total score of collecting data}}{\text{scoring criteria}} \times 100$$

The scores were then interpreted in Table 2.

Table 2 Interpreting score

Value Scale (%)	Category
0-20	Not appropriate
21-40	Less appropriate
41-60	Enough appropriate

Value Scale (%)	Category
61-80	Appropriate
81-100	Very appropriate

[7]

Based on these criteria, Students' Activity Sheet Oriented with Guided Inquiry Orientation to Train Critical Thinking Skill of Inclusive Students in this research is said to meet the criteria if the percentage result is $\geq 61\%$ so it is valid to use in the learning process.

3. Analysis of Students Response

Data about student response was obtained from student response questionnaire after using Students' Activity Sheet then analyzed by percentage and concluded in the form of descriptive sentence. Percentage of data was obtained using Guttman's scoring scale calculation, ie scored 1 if yes and score 0 otherwise. Questionnaires for students, made in the form of "yes" or "no. See Table 3.

Tabel 3 Guttman Scale

Answer	Score
Yes	1
No	0

[7]

The data obtained then calculated by using the formula:

$$\% = \frac{\text{total score of collecting data}}{\text{scoring criteria}} \times 100$$

Scoring criteria = highest score x number of aspect x number of respondent.

The result of percentage calculation from student questionnaire analysis is used to know the validity of the developed students' activity sheet. It is done in limited trial then interpreted to score interpretation criterion.

Based on these criteria, Students' Activity Sheet Oriented with Guided Inquiry to Train Critical Thinking Skill of Inclusive Students is considered feasible and get positive student response if the percentage is $\geq 61\%$.

4. Analysis of Pretest and Posttest Result

This Pretest and Posttest is tested to 40 students, including 2 student with hearing impaired in inclusive class. The learning outcomes will be analyzed until the students reach the minimum score, which is 70. Students are said to reach individual completeness if they achieve a score of ≥ 70 . Students are said to be completed classically if they reach $\geq 75\%$ [8]. Individual mastery can be calculated by:

- Individual completeness

$$\text{Individual completeness} = \frac{\text{students score}}{\text{maximum score}} \times 100\%$$

- Classical completeness

$$\text{Classical completeness} = \frac{\text{number of}}{\text{Total students}} \times 100\%$$

Changes in student learning outcomes were analyzed descriptively. Descriptive analysis is used to explain changes in student learning outcomes.

RESULTS AND DISCUSSIONS

Data of Students' Activity Sheet Validation Result (Internal Validation)

Students' Activity Sheet based on contain, language, and presentation criteria is said to be valid if it gain percentage $\geq 61\%$ [7]. See Table 4.

Table 4. Validation Result

No	Criteria	Percentage (%)	Category
1	Contain	85,07%	Very appropriate
2	Presentation	80,83%	Appropriate
3	Language	83,33%	Very appropriate

a. Validation of Contain Criteria

Students' Activity Sheet validation based on content criteria shows very good criteria in most aspect and there are some aspect which only gets good criterion. Criteria that can be highlighted in the content criteria are within the component of critical thinking skills. Components Provide Simple Explanations through focusing activities on making problems easier for students to understand and analyze the problems. This aspect is in very good criterion because in Students' Activity Sheet has been included phenomena and student can identify the phenomena so that student can understand and analyze the problem by analyzing factor that affecting reaction rate based on which presented in phenomena. Building basic skills through observation of observation data, considering sources and observation reports with the analysis shown on the features get very good criteria. The developed Students' Activity Sheet students can observe and analyze the experimental results data which have been done, exemplified in the factors of surface area that affect reaction rate in Students' Activity Sheet where students were asked to react the eggshell with HCl solution using eggshell size variables. Time of reaction were obtained as the observation data which also become the reaction rate. Students then analyze why size can affect the rate of reaction to students

formulate the analysis to make a conclusion. Concluding Aspects through induced activities and considering induced results. Through this activity students will be able to hypothesise and conclude, this obtain good criteria because this feature has been included in the Students' Activity Sheet but not yet clear what form of induction should be done by students. This is also evident from the student process of experimenting to analyzing that indicates that students will induce from the very common to connect various materials to be formulated into conclusions.

b. Validation of Language Criteria

Students' Activity Sheet validation based on language criteria shows very good criteria on all aspects. Using good and correct sentences obtain very good criteria. The language used based on the maturity level of students obtain very good criteria. The use of clear sentence structure obtain very good criteria. Using communicative language obtain very good criteria. This indicates that the language that used has helped the students to understand the information. Language should also be tailored to the needs of inclusive students by using more effective and non-abstract language to fit the intelligence of inclusive students. Deaf students find it difficult to interpret abstract words because of limitations in vocabulary [9]. "We will study the effect of concentration on the rate of reaction, in this experiment we will react $\text{Na}_2\text{S}_2\text{O}_3$ with HCl in which the reaction characterized by the formation of a turbid yellow solution". The paragraph above quoted in one feature of Critical Thinking Skills, it shows that the sentences use correct structure and adjusted to the level of maturity of students, especially deaf students which make it including to very good criteria.

c. Validation of Presentation Criteria

Students' Activity Sheet validation based on the presentation criteria shows very good criteria in most aspects and some aspects only obtain good criteria. Compatibility with concepts that coherent, consistent, and balanced among sub-chapters obtain very good criteria. This indicates that the developed Students' Activity Sheet has been in accordance with the students' ability proved by the students can formulate the conclusion because previously students have analyzed the results of the experiment first, for example students reacted H_2O_2 solution with KI or without KI. Students know that the catalyst

factor influences the reaction rate due to the addition of KI which will decrease the activation energy so that the reaction runs faster. Presentation of illustrations or images relevant to the subject matter included in good criterion because the illustration or the image based on the concept and the image is clearly visible and has a balanced in contrast of color. The provision of adequate space for the flexibility of students gives the answers obtain very good criteria because the students are able to explore their thinking ability and can pour their mind in sufficient space. Presentation of Students' Activity Sheet contain introduction, table of contents, bibliography, concept maps, objectives, manuals of use gain good criteria. It is very important to provide general information about the developed Students' Activity Sheet.

Student's Questionnaire (External validation)

Results of student responses obtained from students' opinions on STUDENTS' ACTIVITY SHEET based on inductive strategies. The result of students response who answered "yes" on every aspect. The Result of student responses are presented in Table 5.

Table 5. Student's response

No	Criteria	Percentage (%)	Category
1	Contain	100%	Very appropriate
2	Presentation	100%	Very appropriate
3	Language	100%	Very appropriate

Based on the questionnaire results of student responses in table 5 there are 3 aspects with a total of 17 sub aspects. There are 16 sub aspect obtain very good criteria and another aspect obtain good criterion. Students feel developed this activity sheet can help to train students to ask a questions, formulate hypothesis, collecting data, test the hypothesis, and formulate conclusions. This is in accordance with the validation result of the presentation in this activity sheet which featured with asking questions, formulate hypotheses, collecting data, test the hypotheses, and formulate conclusions which obtain very good criteria. Sub aspect of language used in this activity sheet is not ambiguous, clear and easy to understand, it obtain good criteria. This is less in line with the validation of linguistic criteria that get very good criteria on all aspects. The student's response can be due to some unfamiliar words for the students, especially for the deaf students. A slightly unusual word needs to be replaced by a more general word or sentence that is easily recognized by student's especially the deaf students. Deaf children

difficult to interpret abstract words because of limitations of vocabulary [9].

Analysis of Pretest and Posttest Result (External Validation)

Before using the STUDENTS' ACTIVITY SHEET, students did a pretest to know their initial knowledge. The pretest consists of 4 multiple choice questions and four critical thinking skills that must be answered appropriately. In pretest sub content Factors affecting the reaction rate of almost all subjects received low or not complete value but there are 5 subjects who received perfect grade. In the classical completeness of the five students in the pretest of only 12.5%. The main subject of inclusive students is entirely scored under minimum score (<70) or incomplete. The non-completeness of the pretest is due to a lack of student understanding or student's idea about factors affecting the rate of reaction. Students have not been able to analyze a long sentence in which data show factors affecting reaction rate. The problem leads to a concentration factor that affects the reaction rate of HCl solution with Zn with different concentrations of HCl.

After conducting developed STUDENTS' ACTIVITY SHEET using, students doing posttest to know what they learn in the developed STUDENTS' ACTIVITY SHEET. The posttest consists of 4 multiple choices and four critical thinking questions that must be answered appropriately. The posttest result of all subjects showed an understanding of factors affecting the rate of reaction after using the developed STUDENTS' ACTIVITY SHEET. It can be seen from the posttest score of all completed subject. It is also seen in Table 4.10 that is classical completeness, classical completeness gets 100% percentage because all subjects can score above minimum score. The increase of mastery is quite classical from 12.5% (pretest) to 100% (posttest), there is a very volatile fluctuation of 87.5%. This mastery shows that all subjects have learned well during the STUDENTS' ACTIVITY SHEET developed.

CLOSURE

Conclusion

Based on result and discussion of the research, it can be concluded that Students' Activity Sheet Oriented with Guided Inquiry to Train Critical Thinking Skill of Inclusive Students is valid to be used.

1. Based on internal validity in terms of validation results consisting of content

validity, language, and presentation of the developed Students' Activity Sheet Oriented with Guided Inquiry to Train Critical Thinking Skill of Inclusive Students on Sub Material Factors that Affecting Reaction Rate are valid to use. Based on the validation results where the percentage of criterion content is 85.07% with very good criteria, the criterion is 83.33% with very good criteria, and the presentation criteria is 80.83% with good criteria.

2. Based on the external validity reviewed from the results of the questionnaire of student responses to the developed Students' Activity Sheet Oriented with Guided Inquiry to Train Critical Thinking Skill of Inclusive Students on Sub Material Factors that Affecting Reaction Rate is very appropriate to use. Based on the results of student responses to LKS developed with a percentage of 97.21% with very good criteria. The students' critical thinking skills developed are worthy of use. It is based on validation results where the percentage of contents criteria is 83.33%; Presentation criteria 77.49%; and the language criterion is 83.33%.

Suggestion

Suggestions for further research are as follows:

1. The next Students' Activity Sheet to be developed should be given a glossary to make deaf students understand the sentence.
2. Provide a clearer and more detailed visualization so that students with hearing impairment can understand Students' Activity Sheet sub-matter of factors influencing reaction rate.
3. Implementing guided inquiry based Students' Activity Sheet to Train Critical Thinking Skill of Inclusive Students especially for deaf student in inclusive classes.
4. Implementation of Students' Activity Sheet with Guided Inquiry Orientation to Train Critical Thinking Skill of Inclusive Students need to pay attention to facial severity, voice soundness, and gestures to obtain the desired competence.

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