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DEVELOPMENT OF STUDENT WORKSHEET ORIENTED TO CONCEPT MAP ON CHEMICAL BONDING MATTER CLASS X

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Abstrak

Penelitian ini bertujuan untuk mengetahui kelayakan Lembar Kerja Siswa (LKS) dan hasil belajar siswa terhadap lembar kerja siswa berorientasi peta konsep pada materi pokok ikatan kimia kelas X-SMA. Jenis penelitian ini merupakan penelitian pengembangan dengan menggunakan model pengembangan *Research and Development* (R&D). Terdapat 10 langkah pengembangan yaitu potensi dan masalah, pengumpulan data, desain produk, validasi desain, revisi desain, ujicoba produk, revisi produk, ujicoba pemakaian, revisi produk, dan produksi masal. Namun, penelitian ini hanya terbatas sampai enam langkah yaitu uji coba produk. Lembar kerja siswa ini ditelaah dan divalidasi oleh 2 dosen kimia Universitas Negeri Surabaya, 1 guru kimia SMAN Kesamben-Jombang. Subjek penelitian dalam uji coba kelayakan LKS adalah siswa kelas X-3 SMAN Kesamben sebanyak 16 siswa. Hasil penelitian menunjukkan bahwa LKS sangat layak digunakan dengan total persentase kelayakan sebesar 87,20%. Dari penelitian, hasil belajar siswa meningkat hingga 81,25%.

Kata kunci: *LKS, Peta Konsep, Ikatan kimia*

Abstract

The aims of this study to know the feasibility of student worksheet and learning outcomes to student worksheets oriented concept map of chemical bonding matter class X. The type of this research use "research and development" model or usually known as (R&D). There are 10 steps include potention and problem, collecting data, design of product, revision of product, revision of design, test of product, revision of product, test of product and production. But in this research just until test of product. The student worksheet was analyzed and validated by 2 chemistry lecturers of Surabaya State University and 1 chemistry teacher of SMAN Kesamben-Jombang. Subjects of this observation are 16 students of SMAN Kesamben class X-3. The results showed that student worksheet is very suitable to be used with a total percentage of 87,20% viability. The score of student increase from pretest to the postest until 81,25%.

Keywords: *student worksheet, concept map, chemical bonding*

INTRODUCTION

The globalization era requires a nation to prepare a generation that is able to follow the development of science and technology. Developments in science and technology should be supported by the presence of qualified human resources. Education is the main capital for a nation in an effort to improve the quality of human resources. Therefore, Indonesia is trying to improve the quality of education so the human resources can follow the development and technology. This global insistence encourages educators to get a better generation. To get a better generation, students are expected to learn over time.

Students require an adequate teaching material in the learning activity. Teaching material is any material (whether information, tools, and text) are arranged systematically, which show the whole of competencies that will be controlled by the students and used in the

learning process [4]. One example of teaching material is student worksheet. Student worksheet is a printed teaching material in the form of sheets of paper containing material, summaries, and guidelines of learning task to be done by learners, which refers to the basic competencies to be achieved.

The main competence of the chemical bond is to understand the material, applying the knowledge to analyze factual, conceptual, procedural, based on his curiosity about science, technology, arts, culture, and humanities with an insight into humanity, national, state, and civilization related phenomena and events as well as apply the procedural knowledge in specific areas of study in accordance with a blessing and a passion to solve the problems. The basic competence of this material is compare the process of ionic bonding formation, covalent bonding, covalent coordination and metalic bonding and the interaction between particle (atom, ion and molecule) and it's relation with physical characteristic [1].

Based on the results of a questionnaire that was given to the students of class X-3 SMAN Kesamben-Jombang on 23rd February 2013, the data obtained 90,32% from 31 students were given a questionnaire to answer difficult and being in chemical bonding matter. The rest (9,68%) answer not difficult in chemical bonding matter. The student has been using student worksheet in learning activity. However, student worksheet that they use is not oriented to concept map. This leads to 93,54% of students felt the worksheet that they use wasn't help to understand the chemical bonding matter. So from questionnaire data only 12,9% of students who get good score in chemical bonding matter. While 87,1% of the other students get sufficient value and less. A minimum completeness criterion that is used in SMAN Kesamben-Jombang for this subject is 75. From the data available at the school, 45% of student's score below the minimum completeness criterion in the subject matter of chemical bonding and got remedial.

To improve student learning outcomes in class X-3 SMAN Kesamben-Jombang especially in chemical bonding matter is by use student worksheets. Student worksheet that creative and innovative will be able to improve student learning outcomes. Student worksheets that creative and innovative is student worksheet includes concept maps. From the concept map, we can be seen in the students' ability see a scientific topic [3]. The ability of students to analyze this scientific topic can help students to improve their learning outcomes. From that description, the researchers wanted to develop students worksheet eligible to be accepted by learners. Therefore, the writer took the title "Development of Student Worksheet Oriented to Concept Map on Chemical Bonding Matter Class X".

METHODS

This study is research and development. This study was developed by using R&D model. There are 10 steps include potention and problem, collecting data, design of product, revision of product, revision of design, test of product, revision of product, test of product and production [6]. But in this research just until test of product. The instrument used in this study include pretest study questionnaire sheet, revision sheet, validation sheet, achievement test sheet, sheet student questionnaire responses, observation of student activity sheets. Pretest study questionnaire sheet is used to determine the initial conditions of the students. revision sheets used to collect suggestions from experts to perfection the worksheets. Validation sheet is used to assess the feasibility of the worksheet that is developed. Achievement test sheet consists of pretest and posttest sheet that is used to determine student learning outcomes before and after using concept maps. The result of data validation analyzed by quantitative description that includes aspects of feasibility of material, language and presentation. The data is

interpreted in the following table by Likert's scale:

Table 1. Likert Scale

Category	Score
Very good	5
Good	4
Medium	3
Bad	2
Very bad	1

[5]

Interpretation data of the table results Likert's scale was calculated to obtain percentage use following formula [5]:

P(%): $\frac{Data\ score}{Criterion\ score}$ x100 %

Criterion score = highest score x number of aspects of x number of respondents.

The results of the validation analysis then interpreted back to the table as follows:

Table 2. Interpretation of Eligibility Worksheet

Percentage (%)	Criterion
0 – 20	Very less
21 – 40	Less
41 – 60	Enough
61 – 80	Good
81 – 100	Very good

[5]

Based on the interpretation of the results table above, student worksheets that developed will be viable if it reach score ≥ 61% [5].

To see effectivity of student worksheets, it can be supported by the result of pretest and posttest. From the result of pretest and posttest, we can compare the score of student before and after using concept map. Assessment of concept map in the worksheet using the rubric below [2]:

Table 3. Section Concept Map

Aspect	Score
Concept	1
Proposition	1
Heirarkhi	5
Crosslinked	10
Example	1

ANALYSIS AND DISCUSSION

Test of product was done in SMA Kesamben-Jombang class X-3 as many as 16 students with heterogeneous capabilities. Collection of data was conducted two times on February 12th and February 18th, 2014.

1. Feasibility of Student Worksheet
   Assessment of feasibility was given by validator and shown in the following table:

Table 4. Validation Score

Component	Percentage	Criterion
Matter	88,57%	Very good
Presentation	85,33%	Very good
Language	93,33%	Very good
Total	87,20%	Very good

Based on the table above, development of student worksheet said to be very good for use if it is viewed in terms of content, presentation and language with a total percentage 87,20%.

a) In terms of content, student worksheet oriented concept maps was very good with a percentage 88,57% where the feasibility of basic competency and indicators are listed on the worksheet, there are questions on the worksheet, easy to understand and in accordance with the indicators of learning outcomes. In addition, the materials on worksheet also suitable with the curriculum of 2013.
b) The presentation aspect of this worksheet is very good for use with percentages 85,33% eligibility. Validation of the presentation is divided into three main aspects namely physical aspect, view of presentation, andsuitability with the rules of concept maps.
c) In the language aspect, student worksheet is very good with a

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percentage 93,33% viability. There are three aspects of the language aspect that is assessed those are conformity with the rules of Indonesian language is good and true, the use of language that can convey the message effectively and efficiently, and the language that is used to clarify information.

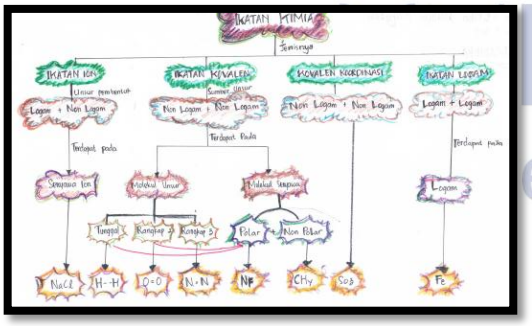
2. Concept Map Assessment Results

In the assessment of concept maps there are several aspects to consider among others, analysis of concepts, hierarchy analysis, prepositions analysis, cross-linking/ cross-linked analysis and giving examples [2].

Table 5. The Results Assessment of Concept Maps

Aspect	Score	Category
Concept	92,25%	Very good
Heirarchy	90,75%	Very good
Proposition	54,04%	Less
Crosslinked	29,58%	Very less
Example	92,18%	Very good

Based on the table above, it can be seen thatthe average of student got good score in the analysis of concepts, making hierarchy and giving examples with very good criteria. However, students are still lacking in giving prepositions and crosslinked.



Picture 1. Concept Map of Student

3. Student Learning Outcomes

The increasing of learning outcomes was measured by using pretest and posttest score. Below is a table of student learning outcomes:

Table 6. Student's Score

	Pre-test	Post-test
Average score	35	74,69
Clasical thoroughness	0%	81,25%

After using student's worksheet oriented to concept maps the score of students has increased from pretest to posttest. The minimum completeness criterion is 75. Clasical thoroughness of learning students in pretest is 0% with the average score 35. But in posttest clasical thorougness of students is 81,25% with the average score 74,69. So there is a significant difference between the test scores of students before and after using the student worksheet oriented to concept map with the increasing as 81,25%.

CONCLUSION

From the data analysis of this study concluded that:

1. Student worksheets gets a feasibility assessment of lecturers and chemistry teacher at 87,20% with a very good category. With details of material/ content aspect get 88,57%, for presentation aspect get 85,33% and language aspect get 93,33%.
2. By minimum completeness criterion 75, student's score increase from pretest to the postest until 81,5%. We conducted a pretest, all students didn't achieve mastery learning with the average score 35 and classical completeness 0%. Meanwhile, after using the student worksheet oriented to concept map and done posttest, student scores increased by the average score 74,69 and classical completeness 81,5%.

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