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DEVELOPMENT OF STUDENT WORKSHEET WITH MIND MAPPING ORIENTED USING iMindMap APPLICATION FOR ATOMIC STRUCTURE AND THE PERIODIC SYSTEM OF ELEMENTS TOPIC

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Abstrak

Tujuan dari penelitian ini adalah mengetahui kelayakan secara teoritis dan empiris Lembar Kerja Siswa (LKS) Berorientasi Peta Pikiran Menggunakan Aplikasi *iMindMap* Pada Materi Struktur Atom dan Sistem Periodik Unsur, serta untuk mengetahui hasil belajar siswa setelah menggunakan Lembar Kerja Siswa (LKS) berorientasi peta pikiran. Metode penelitian yang digunakan adalah metode *Research & Development* (*R & D*) oleh Sugiyono (2011). Instrumen penelitian yang digunakan adalah lembar validasi Lembar Kerja Siswa (LKS), lembar obsevasi, angket respon siswa, dan lembar tes hasil belajar. Sumber data diperoleh dari dosen kimia dan guru kimia, serta 15 siswa SMA Kelas X. Berdasarkan hasil penelitian yang telah dianalisis, rata-rata persentase penilaian dosen kimia dan guru kimia terhadap kelayakan secara teoritis LKS berorientasi peta pikiran menggunakan aplikasi *iMindMap* sebesar 89,63%. Hasil analisis terhadap kelayakan secara empiris LKS berorientasi peta pikiran ditinjau dari penilaian observasi aktivitas siswa oleh pengamat sebesar 87,92% dan respon siswa terhadap kelayakan LKS berorientasi peta pikiran sebesar 92,74%. Selain itu, hasil penelitian menunjukkan peningkatan hasil belajar siswa setelah menggunakan LKS berorientasi peta pikiran menggunakan aplikasi *iMindMap* dengan persentase ketuntasan hasil belajar mencapai 80%.
Kata kunci: Lembar Kerja Siswa, Peta Pikiran, aplikasi *iMindMap*

Abstract

The aims to this research is to know the feasibility of the theoretical and empirical Student Worksheet with Mind Mapping Oriented Using iMindMap Application for Atomic Structure And The Periodic System of Elements Topic, and also to know student mastery learning after using student worksheet mind mapping oriented, The research is using Research & Development (R&D) method by Sugiyono (2011). The instruments of the research are using validation sheet of student worksheet, observation of student activity sheet, student questionnaire responses, and mastery learning test sheet. Sources of data have obtained from the chemistry lecturer, chemistry teacher, and also 15 of high school students on 10th Grade. Based on the research that has been analyzed, the average percentage assessment theoretical validity of chemistry lecturer and chemistry teacher to the feasibility of student worksheet with mind mapping oriented using iMindMap application is confirmed at 89,63%. The analyze results to empirical feasibility of student worksheet with mind mapping oriented based average percentage of student activity observation by observers is 87,92% and the students response to the feasibility of student worksheet with mind mapping oriented by 92,74%. Beside that, the results show that there is an improvement in student mastery learning after using student worksheet with mind mapping oriented using iMindMap application with mastery learning completeness percentage of 80%.
***Keywords**: Student Worksheet, Mind Mapping, iMindMap application.*

INTRODUCTION

Based on Regulation of National Education Ministry number 69, 2013 the curriculum 2013 is developed with improvement of the learning pattern that from teacher-centered to learner-centered

learning**[1]**. In learning process, teacher has very important role. One of the most important task of the teacher is to make the meaningful information for students**[2]**. The teacher has an important role as a facilitator in providing information so that the teacher should be able to teach the learning strategies to students so they can gain meaningful information that will support their academic achievement.

Meaningful learning is a mental processing on new information associated with knowledge or information that has been owned by the students previously**[2]**. The learning process should be associated with the preliminary concepts that have been owned by the students, so that new concepts can be easily understood by students because students construct their own understanding.

One of the learning strategies that can be applied to meaningful learning with mind mapping**[2]**. Buzan argues that mind mapping is creative and effective way of record, and literally mapping out our thoughts**[3]**. Mind mapping is a learning strategy that teaches students to visualize knowledge that received into the picture with colors, lines, and words that can help to better remember, writing ideas, and also saving the time. Mind mapping can load the entire critical information of any teaching materials that are organized by using the appropriate radians structure with the natural brain mechanisms that will make it easier to understand and remember.

Applications to create mind mapping that has been developed by Buzan is iMindMap application. iMindMap Application assist someone in making mind mapping more easily, quickly, and interesting. Someone who does not have good writing and difficult to read and also can not afford to draw will feel very helped in making mind mapping because various types of good writing is provided in the iMindMap application and interesting pictures can be taken from the internet**[4]**.

One of the perceived learning media that can help students and teachers in the learning process is the student worksheet**[5]**. Student worksheet can help students to think, memories, and understand them material easily**[6]**. Students need a Student Worksheet which can lead students in making their own mind mapping. Student Worksheet is a sheet containing questions that lead students to understand the concepts that exist in the material so that students are easier to write an important concept in mind mapping. Based on the results of student questionnaire student agreed as many as 97% if the chemical subject is equipped with student worksheet with mind mapping oriented using iMindMap application.

The material of atomic structure and the periodic system of elements is a material that have concept that hard to understand for student. Based on the results of a questionnaire, students that expressed a difficulty in understanding atomic structure and the periodic system of elements is 54.5% in comparison with the other material which have been taught in 10^{th} grade. This is due to several reasons that experienced by students, such as students that expressed a lot of memorization in the material is 25.9%, less attractive learning is 39.4%, there is no real media support is 42.4% and more elusive concept is 48.5%.

The development of Student Worksheet English Language Mind

Mapping Oriented Using iMindMap Application On The Material Structure of Animal Tissues in Eleventh-Grade of Senior High School 1 Sidoarjoo is classified as very feasible with the presentation of the feasibility of 92.81% and a positive response of students is 96.41% **[4]**.

Based on the condition above, so need research with tittle "Development Student Worksheet with Mind Mapping Oriented Using iMindMap Appication for Atomic Structure And The Periodic System Of Elements Topic.

METHOD

This method of this study is Research and Development that conducted by Sugiyono. The method of this study is only limited until limited-trial test**[7]**. Stages conducted by researchers are: (1) the preliminary study, (2) the design of product, (3) the study of product, (4) product revision, (5) product validation, and (6) the limited trial.

The aims to this research is to know the feasibility of the theoretical and empirical Student Worksheet with Mind Mapping Oriented Using *iMindMap* Application for Atomic Structure And The Periodic System of Elements Topic, and also to know student mastery learning after using student worksheet mind mapping oriented

Data collection methods used in this study were observation, test, and questionnaire methods.

The sources of data obtained from the chemistry lecturer, chemistry teacher, and 15 of high school students that already got atomic structure and periodic system of elements topic.

The instruments of this study are the validation sheet, observation of student activity sheet, student questionnaire responses, and mastery learning test sheet.

The result of validity from lectures and chemistry teacher of student worksheet would be presented based on Likert's scale**[8]**. The formula in obtaining the validity assesment to get the feasibility of Student Worksheet is:

$$Percentage(\%) = \frac{score\ obtained}{maximum\ score}\ x\ 100\%$$

Results of the validation analysis were used to determine the feasibility of Student Worksheet mind mapping oriented using score interpretation**[8]**. Based on the criteria, Student Worksheet mind mapping oriented is feasible if the percentage is ≥ 61% **[8]**.

Analysis of student activity is done by calculating the percentage of student activities suitable with observation category on the observation sheet during student worksheet trials using the formula:

$$Percentage\ of\ student\ activity = \frac{\sum time\ of\ acquisition\ activity}{\sum activity\ maximum\ time}\ x\ 100\%$$

Based on the criteria, Student Worksheet mind mapping oriented is feasible if the percentage is ≥ 61% **[8]**.

The percentage of student response data was calculated based on Guttman's scale**[8]**. The data obtained are then processed in the percentage's form according to the formula:

$$Percentage(\%) = \frac{score\ obtained}{maximum\ score}\ x\ 100\%$$

Based on the criteria, Student Worksheet mind mapping oriented is feasible if the percentage is ≥ 61% **[8]**.

Analysis of pretest and posttest results were used to determine student mastery learning individually. Students said the study was regarded as complete if the student had achieved score ≥ 80. The formula used to calculate mastery learning completeness is:

$$Mastery\ Learning\ Completeness = \frac{sum\ of\ score\ obtained}{total\ score}\ x\ 100$$

RESULTS AND DISCUSSION

1. Validation by Chemistry lecturers and Chemistry teacher.

Based on the results of the validation conducted by chemistry lecturers and Chemistry teacher, student worksheet with mind mapping oriented using iMindMap application is accounted as very feasible with the average percentage of the overall aspects is 89.63% with the details in the following Table 1.

Table 1. Result of student worksheet validation

Aspect	Percentage (%)	Criteria
Presentation Criteria	85,56	Very Feasible
Languages Criteria	93,33	Very Feasible
Suitability Material Criteria	90	Very Feasible
Average	89,63	Very Feasible

a. Presentation Criteria

In terms from the presentation criteria student worksheet with mind mapping oriented has developed the feasibility with a percentage of 93.33% with a very feasible category. This shows that developed student worksheet display is good.

Student worksheet design involves choosing the size, shape, color and text background is in conformity with the student worksheet. Student worksheet design is equipped with an image that can attract the attention of students to learn student worksheet.

b. Languages Criteria

In terms from its linguistic developed student worksheet with mind mapping oriented has feasibility percentage of 93.33% with very feasible category. Media is an intermediary or an introductory message from the sender to the recipient of the message **[9]**. Developed media is feasible from the aspect of language that helps students more easily to understand the information conveyed messages. Student worksheet also use the term in simple terms and consistent so as not to have more than one meaning so that students more easily understand the sentence in student worksheet.

c. Suitability Material Criteria

In terms from the suitability of the material on student worksheet with mind mapping oriented has feasibility percentage of 90% with very feasible category. In preparation, the material presented proportionately, consistently, and systematically. The material that contained on student worksheet is collection of concepts is right. Student worksheet material criteria are selected

on the basis of instructional objectives that have been set, the material must also be in accordance with the level of students thinking so that the meaning contained therein can be understood**[10]**.

2. Response of Students

Based on the results of student responses, student worksheet with mind mapping oriented is very feasible category with an average percentage is 92.74% overall aspects which are described in the following figure 1.

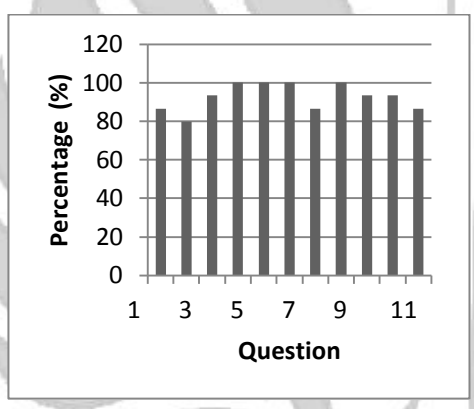

Figure 1. Graph of Students Response

Based on Figure 1 can be seen the percentage of students who respond with yes to each question on the questionnaire. The number of students who respond with yes can show that students respond positively to the student worksheet with mind mapping oriented that have been tested.

3. Student Activities Observation

In terms from student activity observation, student worksheet with mind mapping oriented has feasible percentage of 87,92%. Student activities observation data which are shown in the following Table 2.

Table 2. Student Activities Observation

Student Activities	**Percentage (%)**	**Category**
Student are attention teacher's explanation	100	Very Good
Student read student worksheet or the other reffrence book	76,67	Good
Student note important word for student worksheet	80,00	Good
Student read the way of make mind mapping	80,00	Good
Student read summary	82,22	Very Good
Student read instruction to answer question	93,33	Very Good
Student answer the question	100	Very Good
Student ask question to teacher	66,67	Good
Student ask a question with the others (discussion)	98,20	Very Good
Student make mind mapping	96,67	Very Good
Student do bad attitude (play smartphone, distrub the other student, making annoyed)	6,67	Very Good

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Based on the Table 2, it can be seen that each activity criteria very well. It shows students participate in learning activities well in accordance with the syntax of learning and instruction of student worksheet. The learning process using student worksheet can increase student activity so that the student-centered learning. Teachers only be facilitators to instruct students use worksheets as learning media so that students are active to get their own information and discuss with the group to understand the material being studied.

One example of student activity when they done Student Worksheet with Mind Mapping Oriented Using iMindMap Application is make mind mapping. Example of Mind Mapping for Atomic Structure and The Periodic System of Elements Topic present as Figure 2.

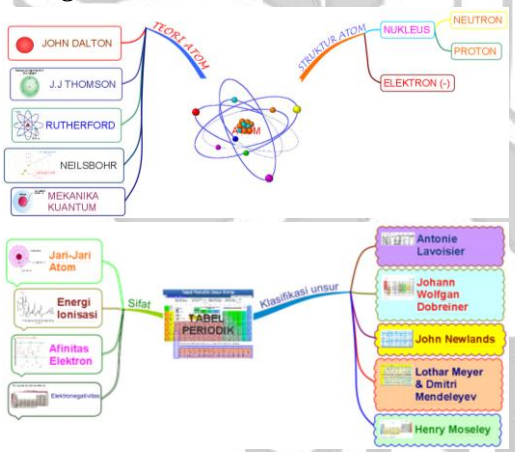

Figure 2. Example of Mind Mapping Using iMindMap Application for Atomic Structure and The Periodic System of Elements Topic.

4. The results of pretest and posttest

Pretest and posttest are used to know the increase in student mastery learning after testing use student worksheet with mind mapping oriented. Student mastery learning test conducted by 15 students Senior High School 1 Krian, with a minimum value of completeness criteria is 80. Pretest and posttest results shown in the following figure 3.

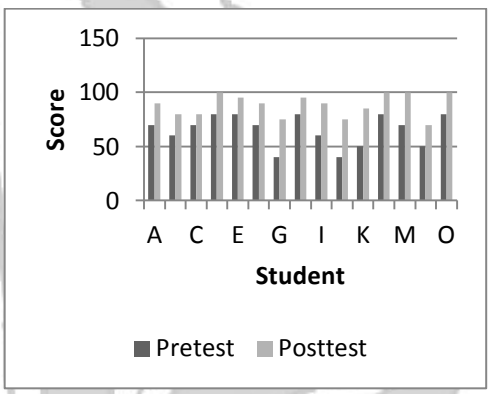

Figure 3. Graph of Pretest and Posttest Result

Based on the figure 3 known student mastery learning is increase after using student worksheet with mind mapping oriented on limited testing with student mastery learning completeness percentage of 80%. Thus, it can be said student worksheet with mind mapping oriented can improve mastery learning.

CLOSING

Conclusion

Based on the research results obtained and analyzed, it was concluded as follows:

1. The feasibility of Student Worksheet with Mind Mapping Oriented Using iMindMap Application for Atomic Structure and The Periodic System of Elements Topic in terms of theoretical validity by lecturer and teacher chemistry obtained an average percentage is 89.63% with very feasible category. The assessment is

based on several criteria such as: presentation criteria, language criteria, and material suitability criteria. These results indicate that student worksheet with mind mapping oriented using iMindMap application has been feasible to use in learning for subject atomic structure and the periodic system of elements in 10^{th} Grade Senior High School.

2. The feasibility of Student Worksheet with Mind Mapping Oriented Using iMindMap Application for Atomic Structure and The Periodic System of Elements Topic in term empirical feasibility based on the student activity observation obtained average percentage is 87.92% with very feasible category and the response of the students obtained average percentage is 92.74% with very feasible category. It shows Student Worksheet with Mind Mapping Oriented Using iMindMap Application for use as learning media to help students understand the chemistry subject.
3. Student Worksheet with Mind Mapping Oriented Using iMindMap Application also provides a positive impact on student mastery learning. This can be characterized by an increase of pretest and posttest result with mastery learning completeness percentage is 80%. These results indicate that the students helped with Student Worksheet with Mind Mapping Oriented Using iMindMap Application for Atomic Structure and The Periodic System of Elements Topic.

Suggestions

Suggestion that can be given for further research are as follows.

1. Student Worksheet material is expanded again so they can gain more information about the materials studied so that students can divergent think and can create mind mapping well.
2. Student Worksheet is developed can not be used as a guide to create mind mapping. Question in student worksheet is clarified so that students can make mind mapping is more easier after using student worksheet.
3. The researcher need to do more interviews to the students about the time and problem when creating mind mapping using iMindMap application.

BIBLIOGRAPHY

1. Kemendikbud. 2013. *Peraturan Menteri Pendidikan dan Kebudayaan Nomor 69 Tahun 2013 tentang Kerangka Dasar dan Struktur Kurikulum Sekolah Menengah Atas/Madrasah Aliyah*. Jakarta: Kemendikbud.

2. Nur, Mohammad. 2008. *Teori-teori Pembelajaran Kognitif*. Surabaya: Unesa University press

3. Buzan, Tony. 2009. *Buku Pintar Mind Map*. Jakarta: PT. Gramedia Pustaka Utama.

4. Amalia, Alfi Rizqi. 2013. *Pengembangan Buku Ajar dan Lembar Kerja Siswa (LKS) Berbahasa Inggris yang Berorientasi Pemetaan Pikiran Menggunakan Aplikasi iMindMap Pada Materi Struktur jaringan Hewan. Skripsi* yang tidak dipublikasikan. Surabaya: Universitas Negeri Surabaya.

5. Mellyani, Sofie. 2015. *Development of Bilingual Worksheet Based on Mind-*

Mapping in Chemical Equlibrium Topic. UNESA Journal of Chemical Education Vol. 4, No 2

6. Yulianda, Yudit. 2013. *Development of Bilingual Worksheet By Using Mind Mapping Learning Strategy For Atomic Structure*. UNESA Journal of Chemical Education Vol. 3, No 1

7. Sugiyono. 2011. *Metode Penelitian Kuantitatif, Kualitatif dan R&D*. Bandung: Alfabeta

8. Riduwan. 2011. *Skala Pengukuran variabel-variabel Penelitian*. Bandung: Alfa Beta.

9. Sadiman, Arief S., R. Rahardjo., Anung Haryono., Rahardjito. 2010. *Media Pendidikan: Pengertian Pengembangan dan Pemanfaatan.* Jakarta: PT Remaja Rosdakarya

10. Sudjana, N dan Ahmad R. 2009. *Media Pengajaran.* Bandung: Sinar Baru Algensindo