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Teacher and Student Needs for Chemistry Learning Tools Class X

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Abstract:
Background*: The acquisition of chemistrylearningoutcomesisinfluenced by a number of factors, one of the factorsbeing the means of learning or learning media. Learning media will have a maximum effect on learningoutcomes if itis in accordance with user needs.*
Materials and Methods*: Data on the needs and difficulties of students and teachers in learning and learning chemical knowledge, is used as a basis for developing learning tools. The purpose of this research is to find out and describe the difficulties and needs of teacher-students in learning and learning chemical knowledge. This research is a qualitative study conducted in the city of Bandar Lampung. In this study involved 4 chemistry teachers and 27 students from 2 high schools in the city of Bandar Lampung. Data or information is collected using a Likert scale questionnaire completed with comments and explanations from the teacher and students.*
Results*The results of this study indicate that from (1) aspects of a learning book, teachers and students generally state that they need the contents of a book that allows maximizing the microscopic conceptualization, (2) other sources of guidance, teachers and students need learning resources to learn and learn knowledge chemistry, especially abstract or microscopic chemical concepts.*
Key Word*:education, science, school.*

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I. Introduction

Chemistry learning outcomes are influenced by several factors. According to Reigeluth (1983) and Slavin (1997) learning outcomes are influenced by the learning methods applied and the conditions of learning. Learning conditions include obstacles, student characteristics and fields of study. Constraints include the availability of learning and learning tools that are appropriate to the needs and difficulties of teachers and students to build and develop critical thinking skills, and help students develop meaningful chemical knowledge.

Means of learning for learning and teaching chemistry to students at school are urgently needed because chemical knowledge is generally abstract so it is difficult for students to understand. To help students develop chemistry knowledge that is generally abstract in a meaningful way, we need tools that are able to communicate and factualize chemical knowledge. Chemistry learning tools based on observations generally contain a presentation of information from one concept to the next. This information presentation is supplemented by examples and sometimes with pictures. The results of observations about students' responses to learning materials show students need a presentation of information with examples and pictures to help them build meaningful chemical knowledge.

To help students build meaningful chemical knowledge, learning tools are needed. For this reason, learning facilities need to be developed. According to Dick & Carey (1991), Degeng (1996) and Willis (1999) learning tools should be arranged, presented and organized with due regard to the needs and difficulties of teachers and students. According to Dick and Carey (1991) general steps to develop learning tools are; (1) identifying, (2) developing, (3) evaluating and (4) revising. At present learning facilities used to teach chemical knowledge in the city of Bandar Lampung need to be organized, presented and organized based on the objectives, and characteristics of the learning material. In addition it needs to be arranged based on the needs and difficulties of teachers and students.

Learning tools needed include learning materials, student activity sheets and instructional media that are able to actualize microscopic, microscopic concepts, symbols, minimize the opportunities for misconception and are arranged, presented and organized based on the learning hierarchy and in accordance with the needs of teachers and students.

Chemical knowledge besides abstract and concrete, is usually presented in symbolic language. Dori and Hameiri (in Robinson, 2003) and Mackinnon (2004) stated that students generally only use chemical symbols to complete mathematical calculations using formulas, but they are not able to connect these symbols with macroscopic-microscopic concepts, as well as otherwise. This means that students only build chemical

knowledge at a basic ability level, not yet at a higher level such as understanding, application, analysis, synthesis and evaluation

According to Phelps & Lee (2003) many students have difficulty understanding microscopic concepts due to, among others, learning books as one of the chemical learning tools used by students, less able to factualize microscopic concepts. To overcome this, learning tools need to present microscopic images that explain the presentation of concepts, and are equipped with chemical symbols.

To develop learning tools Lutheru (1988) stated the means should be; (1) reducing or even eliminating verbalism; (3) overcoming differences in learning experiences based on socioeconomic backgrounds of students; (4) helps provide learning experiences that are difficult to obtain in other ways; (5) overcoming space and time boundaries; (6) fostering students' regular thinking about what they are going through; (7) overcoming things that are difficult to be seen in the eyes; (8) shows the ability to work alone based on experience and reality; (9) overcome things, events, events that are difficult to be followed by the senses of the eye; (10) allows direct contact between students and the environment. Thus learning tools should be arranged, organized to meet the learning needs and active participation of students in the teaching and learning process so that learning objectives are reached to the maximum.

According to Dick & Carey (1991) learning facilities should be developed by following the steps; 1) determine learning objectives, 2) analyze learning objectives, 3) identify input behavior, student characteristics and teacher needs, 4) formulate specific learning goals, 5) develop learning outcomes measurement tools, 6) develop learning strategies, 7) choose and developing learning tools, 8) designing and conducting formative assessments, and 9) revising. This means to produce learning tools that can help students and teachers learn and teach chemical knowledge in a meaningful way, learning tools are arranged based on the needs and difficulties faced by students and teachers and follow the steps of development according to Dick & Carey (1991).

As explained above that learning outcomes are influenced by the learning methods applied and the conditions of learning (Reigeluth, 1983 and Slavin, 1997). This means that to be able to help students obtain learning outcomes at the level of deep understanding, it is necessary to pay attention to the conditions of learning. Learning conditions related to student characteristics are the diversity of students' intellectual development levels. Generally high school students have only reached the level of intellectual development of concrete operations that have not yet reached the level of formal operations. So as seen from the level of intellectual development achieved by students, students have not been able to build chemical knowledge, especially abstract knowledge of chemistry in a meaningful way. However, although students generally have not yet reached the level of intellectual development of formal operations, this does not mean learning chemistry is only about concrete knowledge. Students need to learn abstract chemical knowledge, because chemical knowledge is needed to live in a world that has been flooded with chemicals. The chemicals are in what humans eat, drink, use and medicine.

The gap between the fact that new students reach the level of development of concrete operations, and the necessity to have formal thinking skills to be able to build chemical knowledge, can be overcome by using learning materials that can factualize abstract chemical concepts. However, the availability of such learning materials is very limited and generally schools, teachers and students do not yet have such learning facilities. For this reason, efforts are needed to develop learning suggestions that can abstract abstract chemical knowledge.

II. Material And Methods

This research is a qualitative study aimed at expressing the needs of teachers and students for chemistry learning facilities, for learning and learning chemical knowledge. This research was conducted in the city of Bandar Lampung. In this study involved high school class X chemistry teachers in the city of Bandar Lampung, namely teachers of SMAN 13, Perintis High School. All necessary data or information is collected using a questionnaire and observation sheet, with interview, observation and questionnaire sheet filling. Data is taken from teachers and students who are used as research samples by visiting research samples. The data obtained is then tabulated and analyzed.

The subjects of this study were teachers and class X high school students in the city of Bandar Lampung. Teachers used as research subjects are teachers from 2 high schools, and class X students who are used as research subjects as many as 30 people. The teachers who were the subjects of the study were selected based on the number of teachers who taught chemistry subjects in class X. Students who were made the subjects, research, were randomly selected from all class X in each school. The research variables consist of the needs and difficulties of teachers and students in learning and learning chemistry.

III. Result

results of the study were obtained from qualitative and quantitative data. Qualitative data is a description of the results of observations and interviews with teachers and students regarding the needs of chemistry teachers and class X students regarding learning materials that can be used as a guide for teachers and students to learn and learn. Quantitative data that is the percentage of aspects of the needs of chemistry teachers and class X students in the handbooks and other learning resources other than the handbook are shown in Tables 1,2, 3 and 4 below.

Table no 1 : Percentage of Teacher and Student Needs for Handbooks

No.	Indicator	Score/ ∑ Respondent				Total score	Percentage (%)
		4	3	2	1		
1	Coverage of basic competencies in the book used	6	16	5	0	82	75.9
2	Presentation of concepts in book contents	6	18	3	0	84	77.8
3	Presentation of microscopic concepts in book	3	12	11	1	71	65.7
4	Microscopic images presented in book	4	14	6	3	69	63.9
5	Sample presentation in book	0	0	0	27	27	25.0
6	Examples of microscopic images in book	2	14	9	2	45	41.7
7	Opportunities to involve active students in learning	4	19	2	2	79	73.1

IndicatorScore

1: lack
2: enough
3: good
4: very good

Table no2: Percentage of Chemistry and Teacher Needs for Learning Resources Other Than Handbooks

No.	Indicator	Score/ ∑ Respondent				Total score	Percentage (%)
		4	3	2	1		
1	Availability of learning resources for chemistry in schools	1	16	9	1	67	62.0
2	The need for other learning resources to teach the concept of microscopic chemistry	11	15	1	0	89	82.4
3	The need for learning resources in the form of moving / rotating images to actualize abstract chemical concepts	11	16	0	0	92	85.2
4	The need for learning resources in the form of models that can factualize abstract concepts	12	15	0	0	93	86.1
5	The need for the availability of a learning environment as a source of learning chemistry	2	11	12	2	59	54.6
6	Availability of learning resources for chemistry in schools	1	16	9	1	67	62.0
7	The need for other learning resources to teach the concept of microscopic chemistry	11	15	1	0	89	82.4

IndicatorScore

1: Not available / less needed
2: Enough available / enough needed
3: Well available / needed
4: Very available / badly needed

1) Fill in the Book

The percentage of chemistry teacher needs for the handbook that includes basic competency coverage in the book used, the concept presentation in the book content, microscopic concept presentation in the book content, microscopic image presentation, general sample presentation, microscopic concept sample presentation, opportunities to involve students active in learning, moving from 22.2 - 75%. This means tha22.2% to 75% of teachers and students need a handbook with the coverage as described above.

Percentage of students' needs and difficulties with the handbook which includes a handbook helps understanding chemical concepts in general, explanations help understanding chemical concepts, interest in the presentation of chemical concepts accompanied by images, presented images help understand microscopic concepts, the examples presented help to understand microscopic concepts, moving from 9.7 - 34.4%. This means that 9.7% to 34.4%, students have difficulty learning chemistry and need handbooks.

2) Supporting Sources

Percentage of chemistry teacher needs for learning sources other than handbooks covering the needs of other learning resources for learning microscopic chemistry concepts, learning resource needs in the form of moving/rotating images to actualize abstract chemical concepts, learning resource needs in the form of models that can factualize concepts abstract, the need for the availability of a learning environment as a source of learning chemistry, moving from 58.6 - 86.1%. This means that 58.6% to 86.1% of teachers need learning resources other than handbooks.

Percentage of students' needs and difficulties for other learning resources to understand the concept of microscopic chemistry, interest in explanations with moving / rotating images in school, availability of learning resources in the form of moving / rotating images in school, the need for moving / rotating images to understand chemical concepts, interest in serving chemical concepts accompanied by chemical models, chemical models help understand chemical concepts. the availability of learning resources in the form of chemical models in schools, the availability of the learning environment as a source of learning chemistry, the interest in the learning environment, moving from 45.4 - 83.7%. This means that 45.4% to 83.7% of students need learning resources other than handbooks.

IV. Discussion

Analysis of data about the needs of teachers in class X chemistry handbooks / teaching materials, in Bandar Lampung city high school states teachers need handbooks that enable the achievement of all basic competencies in chemistry learning, the content of textbooks makes it possible to teach chemical concepts, handbooks help students understand the concept of microscopic chemistry, the contents of the book there are pictures that help teachers learn microscopic concepts, the contents of the book provide examples in learning chemical concepts, the examples in the book need to help teach the concepts of microscopic chemistry, books need to provide opportunities to involve students actively in learning. That is, in general the teacher states the teacher needs a handbook with the characteristics of the scope as described above, in accordance with the teacher's need to learn chemistry meaningfully. Teachers need textbooks in terms of the quantity of textbook availability and the suitability of textbooks with the curriculum used. The teacher has not looked at the needs of the aspect of textbook opportunities to facilitate and guide students to learn macroscopic, microscopic and symbolic chemical knowledge in a meaningful way, and have not seen the need to build critical thinking skills and minimize opportunities for students' misconceptions.

Questionnaire data analysis reveals teacher needs for learning sources other than handbooks, such as chemical laboratories, glassware, chemicals, computer laboratories, libraries, learning media (multimedia,learning CDs, internet), and LCD. It was revealed that teachers generally need learning resources besides handbooks. The need for suggestions to support the learning of chemistry, especially in media capable of describing microscopic concepts. Teaching microscopic concepts requires teachers to actualize these concepts so that they are easily understood by students and misconceptions do not occur.

Analysis of data regarding students' needs in the handbook / learning material, obtained data students need media that can help understand abstract chemical concepts, students like the presentation of chemical concepts accompanied by pictures, images in the handbook and help understand microscopic concepts.

Analysis of questionnaire data revealing the needs of students on learning sources other than handbooks, such as chemical laboratories, glassware, chemicals, computer laboratories, libraries, learning media (multimedia, learning CDs, internet), and LCD, revealed that students needed learning resources to understand microscopic concepts, students like explanations accompanied by moving images, moving images help students to understand chemical concepts, students like the presentation of concepts after the use of models, students state chemical models help to understand concepts.

There are several factors that cause learning resources and supporting learning resources needed to help teachers and students learn chemistry, which ultimately affects the acquisition of student learning outcomes.

These factors are learning the concept of chemistry requires the ability of teachers to facilitate students to learn microscopic, macroscopic concepts and minimize the chance of misconceptions. Means of learning need to be arranged based on the hierarchy of learning and needs. According to Dick & Carey (1991) learning facilities should be developed with steps; (1) identifying learning and behavioral needs and students' initial characteristics, (2) developing learning tools by writing learning objectives, benchmark reference tests, developing learning strategies, and developing learning materials, (3) evaluating and revising portfolio of learning facilities.

Means of learning that are in accordance with the characteristics of teachers and students, based on an analysis of the difficulties and needs of teachers and students, are:

1. Adapted to the characteristics or potentials of the Lampung area and equipped with multimedia learning that can concrete abstract concepts.

   The Lampung area is generally a dry land but rich in marine natural resources, and produces cassava, copra, coffee, pepper, rubber, sugar cane, banana, oil palm and corn. Lampung crops like cassava are generally processed into tapioca flour, sugar cane is processed into sugar, palm oil is processed into edible oil while the waste is processed into washing soap and coconut water waste is processed into nata de coco. The characteristics and potential of this area can be used as a source of chemistry learning for appropriate material. For example, to study environmental pollution material, students can learn by testing tapioca factory waste, sugar mill waste, palm oil mill waste, nata de coco plant waste. To learn electrolyte solution material, students can learn by testing the electrical conductivity of sugar solutions, factory liquid waste, coconut water. To support the understanding of the concept of environmental pollution related to the concept of chemistry, we need a media that is able to describe the concept of microscopic, macroscopic and chemical symbols of environmental pollution.
2. Adapted to the needs and difficulties of teachers and students.

   Based on the difficulties and needs of the teacher, the learning facilities needed are facilities in the form of learning materials and media which; (1) interesting, (2) helps build understanding after practicum activities in the laboratory, (3) helps build understanding of abstract chemical concepts, (4) factualizes microscopic and macroscopic concepts, (5) provides training to improve understanding concept, (6) communicative language, (7) can overcome the limitations of learning time in school.

V. Conclusion

Based on the description of the needs of teachers and students on learning and learning chemistry materials, it can be stated that teachers and students need learning tools that can help teachers teach and students learn chemical knowledge. The learning tools needed are learning tools that can actualize abstract concepts, by presenting moving pictures, interesting colors, communicative language, examples that are appropriate and accompanied by explanations and can build students' critical thinking skills.

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