THE DEVELOPMENT OF CONTEXTUAL BASED CHEMICAL TEACHING MATERIALS ON COLLOID IN THE ELEVENTH GRADE NATURAL SCIENCE STUDENTS OF SENIOR HIGH SCHOOL 7 PALEMBANG

Raddini[1], Fuad Abd. Rachman[2], Djamaah Sopah[3]
2) fuad.abdrachman@yahoo.co.id, 3)s_djamaah@yahoo.com
SMPN 1 Palembang[1], Sriwijaya University[2,3]

Abstract

This research is aimed at developing chemical Colloid module based on the context which is valid, practical, and has a potential effect on student learning outcomes. The development research used Rowntree development model which includes the planning, development, and evaluation. Phase evaluation used formative evaluation Tessmer product comprising the steps of self-evaluation, expert evaluation, evaluation of one-on-one, small group evaluation, and field tests. The development of research was carried out at Senior High School 7 Palembang. Data collection techniques used were validity tests, interviews, questionnaires, observation, and tests. Once the module was developed, teaching materials were validated by experts, designers, and linguists. The module teaching materials were tested in a one-to-one and small group to test their practicality. To determine the potential effect of teaching material module, field test was conducted. The results indicated that teaching material module of Chemical Based on Context on Colloid Materials was valid and practical, and had a potential effect on students' learning outcomes. The researchers advised that the teachers make use of the teaching materials module in high school as a new innovation and increase knowledge and understanding of students in the learning process. Besides for other researchers, it can be used as a reference in the development of better products.

Keywords: Development, chemical module based teaching Contextual in materials Colloid, Senior High School 7 Palembang

INTRODUCTION

Chemistry is a branch of Natural Sciences which is taught in Senior High School (SMA). Although in the competence based curriculum (CBC), some chemical materials are introduced in junior high school, especially chemistry concepts related to daily life day. According to CBC, teaching chemistry in high school is done with a spiral approach, and the concepts in class X deepened and expanded in class XI and class XII (Depdiknas, 2006). Thus if the chemical concepts in class X are mastered well, then the next concept will be more easily controlled.

According to Sastrawijaya quoted in Supatmiati (2009, p.1), a concept in science can only be understood if the fundamental concepts involved in the formation of a new concept have been completely owned. In other words, the initial knowledge of chemistry is very influential on subsequent learning achievement.

Chemistry subject is one of the subjects that is considered difficult at this time. As a result, many students are not successful in learning chemistry, so that it develops the notion that teaching science subjects, especially chemistry is very difficult and daunting among them.

Chemistry lesson is learning and understanding concepts. If on that subject students can not understand it, the impact on other subjects related to each other is the students do not understand. It can make students become not happy with chemistry, and ultimately will lower the value of chemistry students.

In general, senior high school 7 Palembang students tend to learn by rote rather than actively to seek their own understanding of the chemistry concepts. How to learn as it causes a chemical concept is an abstract concept for students, even they can not recognize the key concepts or relationships between concepts necessary to understand the concept. Thus, to be able to understand the concepts in chemistry requires a correct understanding of the basic concepts that build the concept.

Actually teachers of Senior High school 7 Palembang have been trying new methods of teaching. With the hope the chemistry lesson will be an interesting subject which can ultimately increase the interest of students to be more active in studying, but the results have not been satisfactory.

It can be seen from the low value of the semester exam results obtained by students in chemistry subject. From the data of semester exams of the eleventh grade of senior high school 7 Palembang, it was revealed that the percentage of the students who scored above the minimum required criteria (MRC) was still below 80%. This happened because the chemistry is not contextual learning. Teachers providing subject matter still referred to the material in textbooks. The subject matter was not developed and was associated with the context of the student environment. Therefore, students had difficulty learning the materials Chemistry lesson.

Based on the interviews with the teachers of Chemistry at seior high school 7 Palembang, colloidal material was generally delivered through textbooks in which students read the materials containing in the textbooks, and understood contents and then were asked questions on the subject matter. This happened because there was a lot of colloid materials had to complete within one semester.

Learning strategies are more important than the outcome. In this context, students need to understand the meaning of learning, the benefits, the status, and how to achieve it. They are aware that what they learn is useful for their future life. They learn what is beneficial to him and try to reach it. In this effort they require teachers as advisors and mentors (Trianto, 2010, p.103).

Something new is coming from 'find themselves' instead of 'what the teacher says'. That's the role of teacher who manage the class using contextual. CTL was developed with the

purpose of making learning more productive and meaningful. CTL can be run without having to change the curriculum and the existing order.

Learning chemistry always changes from time to time. Whatever the learning model is used, chemistry learning consists of the same components, namely teachers, materials, methods and media, students and the environment. These components interact in the chemistry learning process, to achieve the purpose of learning or basic competencies that have been set. Based on the above explanation, the researchers want to develop a teaching material in the form of colloid chemistry modules based on contextual learning. Before lesson plan of colloid chemistry made by teachers had not referred to the contextual, so related the researchers want to study this development.

A module is a learning package related to the smallest unit of a certain subject. The module is a tool or a means of learning which contains the materials, methods, limitations, and how to evaluate systematically designed and attractive to achieve the expected competencies with level of complexity (MONE, 2007, p.37). A module usually contains only one subject matter. One of the chemistry materials in a high school is a colloid chemistry developed by chemistry-based contextual learning. This is because the colloid is a substance that is common and familiar with the lives of learners. Simple examples of a common colloid for learners in everyday life are gelatin, ink, milk, shampoo or clouds. Based on the above description, the formulations of the problem in this study were: *(1) How to develop the teaching chemistry materials module based on contextual learning on the Colloid subject to become valid? (2) How to develop the teaching chemistry materials module based on contextual learning on a Colloid subject to become practical? (3) How effective the teaching chemistry materials based on contextual learning that have been developed for the learning outcomes of eleventh grade students of Senior High School 7 Palembang?*

THEORETICAL FRAMEWORK

One of the ways to make chemistry lesson interesting is to develop teaching materials of Contextual Teaching and Learning (CTL) in the form of modules. The development of this teaching material module is the concepts that help teachers relate between the materials taught with real-world situation of students and encourage them to apply their knowledge in their lives as members of the family and society. With this concept, the learning outcomes are expected to be more meaningful for students. The learning process takes place naturally in the form of student work activities and experience, not a transfer of knowledge from teacher to student.

Contextual-based learning is a learning model that is centered on the learner (student centered learning), because in contextual learning, each student is required to be more active in the learning process and make a concept / abstract material becomes more real for students. Based on contextual learning by John Dewey in Nurhadi and Senduk (2003) the students will learn better if what is learned is related to what is already known and the activities going on around him. Based on the above quotation, the task of the teacher

is to help students achieve the learning objectives in accordance with the basic competence that must be mastered. It means more teachers deal with the development of the material rather than give information. The task of a classroom teacher as a team to work together to find something new to the class (students).

METHOD

This study applies research of development (development research) using the model development Rowntree. According to Prawiradilaga (2008: 45), Rowntree development model consists of three phases: a) the planning stage (planning); b) the stage of development (development); Meanwhile, to make the evaluation of the product refers to the formative evaluation (Tessmer, 1993: 16) that includes self evaluation, prototyping (expert reviews, one-to-one and small group), and a field test Data collection in this study were collected through various sources such as experts, students and respondents. To obtain the necessary data in this study data collection techniques such as validation sheets, interviews, questionnaires, observation, and testing were used. Data analysis consisted of test validation, analysis of the interview data, questionnaire data analysis, analysis of observational data, and analysis of test data.

RESULTS AND DISCUSSION

Results

The planning stage began with a needs analysis. The study was conducted by interviewing with teachers of subjects Chemistry subject and 25 male and female students of Senior High School 7 Palembang. From the interviews it was known that the barriers experienced by teachers and students in the learning process are among others: (a) self-learning students were not familiar and still teachers were considered as sources of knowledge; (b) the lack of preparations made by the student before the lesson began; (c) students were not used to practice the chemistry materials in everyday life; (d) learning materials were limited to textbooks so the students' knowledge was limited to what was in the textbook and what was given by the teacher and teaching materials available still contained a lot of theories without problems that support the creativity of students.

Therefore based on the researchers wanted to develop a contextual-based chemistry teaching materials on the subject of Colloids by analyzing previous syllabus and students' characteristics

a. Analyzing Syllabus and Chemistry Course Materials

In this study, the researcher only developed teaching chemistry materials contextual based on the subject of Colloids. Basic competence was divided into two meetings. In the first meeting, the learning was done directly by the teacher using lecture, question and answer, and teachers had used on colloid subject. In the second meeting, the learning process was designed using contextual learning with discussion and problem-solving models and using contextual teaching materials.

The reason why the researchers chose standard competence and base competence, that the material contained in the decree, and base competence is the material presented in the first semester (June-December 2013). In order the material presented to be mastered and learned by the students easily, innovation in learning by teachers, such as method and teaching materials is very much needed.

One innovation that can be done is to develop teaching materials in the form of contextual-based modules on the subject of Colloid that can build the power of thought to the material being studied and experienced to be constructed into the experience and new information in understanding a concept and knowledge

b. Analysis of Student Characteristics

At this stage the researcher identified the behavior and characteristics of students who were served as a pilot group. The characteristics of students became the basis for the development of the module. The aim of the researchers to learn the characteristics of the students was to determine the general ability of the students regarding the chemistry material especially colloidal material. This is done in addition to determining the subject of testing the use of the chemical module based on contextual-based colloidal material also as a reference in developing tools / test / level of difficulty of the test. From the results of this phase the eleventh grade students of Senior High School 7 Palembang had been chosen. The reason for choosing this class is based on the data in the form of the value of the task, process and test scores in getting the data in which the level of academic characteristics of this class was quite good and their abilities were varied

Results of Phase Development (Development)

a. Identifying Instructional Objectives

Design of teaching materials aims to increase the power of thought or reason students in discussing about Colloid topic. The learning process using contextual-based teaching materials is also equipped with a lesson plan (attached) as a learning scenario performed. There two principal matter with indicator: (1) Make a variety of colloidal systems with materials that are nearby with indicator: Distinguishing the mixture into the solution, colloidal systems and suspense rough; Give some examples of colloidal systems; and Classifying types of colloids by the dispersed phase and the dispersing phase; (2) Grouping properties of colloids and their application in everyday life with indicator: Describe the properties of colloidal, Doing experiment colloidal properties, and Distinguishing colloids and colloidal liofob liofil.

Furthermore, the initial design of teaching materials made subsequently made or in the production became the first prototype

b. Formulating Outline Content

The outline of the content of the material (GBIM) on the subject of colloids.

Title : Colloids Competency

Standards : describing the system and colloidal properties and their application in everyday life.

Basic competencies: creating a variety of colloidal systems with material that is around; Grouping colloidal properties and its application in everyday life.
Goal : Eleventh grade students of High School

c. Writing Content

An outline of the contents of the module that has been prepared as a basis for designing a contextual-based chemistry teaching materials in the form of modules. This contextual-based Instructional Materials consist of:

- Description of Subjects. This section contains a brief description of the subjects of Chemistry and one subject in the first semester of grade XI
- Introduction. Introductory section contains a brief description of the material that will be taught in the module, the intended learning objectives that can be achieved by students, standards and basic competencies, part of learning activities and learning instructions.
- Learning Materials. Learning material is presented in two learning activities. Each learning activity consists of a description of the material, exercises, summaries and formative tests.
- Formative Test Answer Key. The answer key is used to help students recognize the achievement of students in formative test work. For this formative test answer keys will be given at the end after students complete all the questions that exist in the contextual-based teaching materials.
- Bibliography. Bibliography serves as a reference for students when studying the module.

Results of Evaluation Phase

Contextual-based chemistry teaching materials on the subject of Colloid which have been designed in the form of so-called prototype module 1. In the first prototype self-evaluation phase is then carried out followed by an expert review phase which consists of content, the design of learning materials, and language. Furthermore, after expert review, contextual-based chemistry teaching materials on the subject of Colloid were tested (one-to-one evaluation) to 3 students in who have different abilities, low, fair, and high. After a one-to-one evaluation small group evaluation (evaluation of small groups) was done, and finally was a field test (field test).

a. Self Evaluation

For the very first prototype instructional materials Chemistry assessed by the researchers themselves are called self evaluation that aims to minimize the error of writing, the material and design harmony Chemistry teaching materials related to the content, design and language learning material from this prototype teaching materials. Prototype teaching materials produced by the study investigators deemed good enough. Next will be validated by a team of experts and tested on a one to one evaluation to identify and reduce errors that exist in the Chemistry teaching materials. Thus resulting prkatis teaching materials and can be easily used by students.

b. Validity Expert (Expert Review)

In this study, contextual-based chemistry teaching materials on the subject of Colloid conducted validity covering the validity of the content (content), the validity of the design and the validity of language learning materials.

After consultation with the supervising researcher makes a written request addressed to the validator which consists of validators language, content, and design of learning materials. Test validation to the experts was conducted from September 12, 2013 until September 30, 2013. The validators were comprised of three experts who are experts in their respective fields, and asked to give advice, opinions, feedback on the design of teaching materials chemistry contextual based on the subject of Colloids by filling out a validation sheet that had been provided and are also asked to provide an assessment on the assessment sheet.

Expert review involved three expert checks, such as: content, design, and linguist. All of them were signing Valid. Although researchers have developed prototype one which has been declared valid, the experts continue to provide criticism and suggestions for improvement of teaching chemistry materials contextual learning on the subject of Colloids.

c. Trial One To One

The trial one to one tested on 1st november 2013 to 3 students at Senior High School 7 Palembang in class XI Science 5, who had different capabilities fair, low and high. Students were given questions of contextual-based chemistry teaching materials on the subject of Colloids. The test result of one to one to three students had no revision because all three students commented and gave positive feedback. Based on the comments, suggestions, opinions, and feedback a trial in a small group was done.

d. Test Small Group

After prototype 1 design was revised to become prototype 2, it was tested on a small group of the eleventh grade natural science (XI IPA) students of state senior high school 7 Palembang 6 November 2013. This phase was aimed to look at the practicality of teaching materials produced. The test of prototype of teaching materials was done by forming small groups learning which consisted of eight students: Muzammil Ahmad, Aidil Fitriansyah, Andi Nita Rahayu, Ariesya Nurima Yolandari daughter, Linda Lester, M. Kosim Nurseha, Nicko Dwi Juliyanto, Yulia Puspita Sari. During learning activities students learnt teaching materials with their own in the classroom of XI IPA 2. After the students finished studying the material of the teaching materials, then students were given a questionnaire for the requested assessment and response to chemical-based contextual teaching materials on the discussion of subject Colloidal discussion.

In addition, the test results of this small group was expected to give an idea whether this prototype could be applied or was practical in use. The average response on a small group was 91% students who responded the category of very good. Of 8 students who responded 91% said very good.This indicated that contextual-based chemistry teaching

materials on the subject of Colloids can be used in the learning process. Then contextual-based chemistry teaching materials on the subject of contextual-based Colloid Chemistry was practical in use at class XI IPA.

In general, the response of students in small group evaluation of the use of chemical-based contextual teaching materials on the subject of Colloids has been very good. Learners feel happy when learning chemistry performed using contextual-based teaching materials chemistry. This means that contextual-based chemistry teaching materials on the subject of Colloid was categorized practical in use.

e. Test Field

Field tests conducted on 11 November 2013 were given to 25 students of the eleventh grade of natural science 1 of senior high school 7 Palembang consisting 4 males and 21 females. In this test field the researchers conducted learning activities using chemical-based contextual teaching materials on the subject of Colloids. This activity was carried out in two sessions; the researchers were also assisted by 1 person to observe the activities of the students during the learning process. Before learning pretest was given and posttest was given in the second meeting in order to determine the potential effect (influence) of the use of chemical-based contextual teaching materials on the subject of Colloids, the learning outcomes of students before and after using the teaching materials.

1. Data observation (Meeting I)

Observation data appearing in every activity was rated 1 and the one appearing rated 0. Based on the recapitulation of students' activity during two meetings, the researchers added, and made an average of: activity (1) 64% and activity (2) 86%,. Total scores obtained was Percentage = 150/2 × 100% = 75%

Thus the observation results of students' activity during two meetings on the trial field test were 75% of active students and 25% not active students.

2. Results of Pre-test and Post Test

Each student's answers was scored according to the answer key, the correct answer was given a value of 4 and the incorrect one was given a score of 0, Then all the scores were added using percentage. The completeness criterium was at least 76.

The average score obtained by the students during the pretest was 28.16 with a very low category, while the average score obtained during the post-test was 84.60 with a high category from 24 students who scored high category and 1 student who scored very high category. Compared with the average score of the learners in the pretest and post-test there was an increase of 56.44 points. This suggests that the potential effect of chemical-based contextual teaching materials on the subject of Colloid was very well therefore the module can be used by students.

Discussion

1. The validity of Contextual-Based on Chemistry Teaching Materials Chemistry on Colloids Topic Contextual-based chemistry teaching materials on the subject of

Colloid was declared valid after the various stages starting from interviews with teachers, students, analyzing SK and KD, and student characteristics. Furthermore, the results of the analysis of design research in the form of teaching materials were evaluated by testing it in various stages, starting from asking for advice, opinions, comments from three experts who were experts in the fields respectively, and then the three experts were asked to provide an assessment of the teaching materials.

The validity tested covered content validity (contents), the validity of the design and the validity of language learning. For the validity of the language the validator was Mr.Mulyadi Eko Purnomo, Nyayu Khodijah , the provided suggestions, comments and gave ratings of 3.67 with a valid category.The validity of the design of instructional materials as validator is Mrs Nyayu Khadijah, ssessment of teaching materials Chemistry of 4.38 with a very valid category.Furthermore, the validity of the content (content) as validator is Mr.Hartono , an assessment of the contents of this chemical resource of 3.75, then the category is valid. Then the results of the assessment of the three validators with the results averaged 3.93 with a valid category. Thus contextual-based chemistry teaching materials on the subject of Colloid declared valid and can be used.In addition to validating the experts, chemistry teaching materials have also been tested on 3 students with different abilities (one to one), they were asked to comment on the teaching materials chemistry of the three states of matter such students, content, appearance and very easy to understand language and very interesting.

2. Practicality of Contextual-Based on Chemistry Teaching Materials Chemistry on Colloids Topic Practicality means the teaching material is feasible and easy to use. To know whether this teaching material can be implemented practically. The researchers tested 8 students (smallgroup), by distributing Contextual-Based on Chemistry Teaching Materials Chemistry on Colloids Topic on the subject of Colloid. Then the students learnt and tried to work on the problems that exist in the chemistry teaching materials. After the students were given a student questionnaire to determine the practicality of this chemistry teaching materials. From the results of the questionnaire given to responses 8 students 91% responded very good and 9% good. This means Contextual-Based on Chemistry Teaching Materials Chemistry on Colloids Topic the subject of colloids can be practically used.

3. Effectiveness of Contextual-Based on Chemistry Teaching Materials on Topic Colloids on learning outcomes From the test results to the actual research to 25 students of the eleventh grade natural science (XI IPA) students of state senior high school 7 Palembang it showed that these teaching materials had potential effects on learning to use the Highlights Colloid Chemistry. This is evident from their passion to learn the material through-Based Contextual teaching materials. From the observations, it indicated the learning activity using Instructional Materials Chemistry-Based Contextual On Topic Colloids was 75% active, while the learning outcomes of students using Instructional Materials Chemistry-Based Contextual On Topic Colloids shows

the average score of 84.60 was in excellent category and twenty-five learners to complete 100%. As such products Instructional Materials Chemistry-Based Contextual On Topic Colloid researchers have developed a potential effect when used in the learning activities of students in Chemistry in class XI IPA 1 Senior High School 7 Palembang.

4. Advantages and Disadvantages of Instructional Materials Chemistry Contextual Based on Colloidal Developed Highlights The advantages are contained in Chemistry teaching materials based on the subject of Colloid contextual developed, among others: (1) student motivation in working on the problems of Chemical higher, because students get questions that correspond to everyday life; (2) students can learn at your pace and ability of each for Chemical-Based Contextual teaching materials on the subject of Colloid designed for independent study. In addition, students can repeat the material if they do not understand; (3) students can get this module at a cheaper cost than textbooks are provided by the publisher. Due to time constraints and the ability of developers in terms of the technical content of the material and then there are shortcomings and limitations in the development of teaching materials Chemistry contextual based on the subject of colloids, namely: (1) the use of this approach makes the class a bit chaotic atmosphere that makes other classes disrupted; (2) contextual approach requires teachers to think wide and deep, sensitive to different ideas of students, teacher-oriented delivery of content and do not have extensive information rather difficult to accept the opinion of the students; (3) contextual approach is an approach that exist in real life, this requires a long process and each student requires different handling especially when dealing with a curriculum that is standard, which requires that the material should be in accordance with the curriculum.

CONCLUSION

This research has resulted in a product in the form of contextual-based learning teaching chemistry materials on the subject of Colloids. Based on the research results it can be summarized as follows: (1) contextual-based chemistry teaching materials on the subject of Colloid were declared valid by the material (content), the design of learning materials (construct), and language by subject matter experts, expert design instructional materials, and expert language so that they can be used in teaching the subject of Colloid Chemistry; (2) contextual-based chemistry teaching materials on the subject of Colloid were declared practical after being tested to the tenth students of Senior High School Palembang both in one-to-one or a small group; (3) In the field test phase analysis based on the percentage ratio of the average pretest and post-test of 28.16 and 84.60 using Chemical-Based Contextual teaching materials on the subject of Colloid completed 100%. It showed there was an increase of 56.44 the students' mastery in the learning process. This means Instructional Materials of Chemistry-Based on Contextual on Colloids at Senior High School gave the potential effects on students' learning outcomes.

Based on the above conclusions, the researcher suggests: (1) The teacher should use teaching materials in chemistry-based contextual learning; (2) Students should be more active in the learning process, managing the materials obtained, showing the ability of learning, and receiving direct feedback and stimulating learning motivation in contextual learning; (3) should be more independent learners should in studying chemistry so that the learning will be more interesting and more fun; (4) researchers should continue this development for other materials Chemistry, making it easier for students in the learning process.

REFERENCES

Ministry of National Education. (2006). *Curriculum Subjects Chemistry*. Jakarta: Directorate General of Primary and Secondary Education Directorate of Secondary Education.

Ministry of National Education. (2007). *Contextual Approach (Contextual Teaching and Learning (CTL)*. Jakarta: Directorate General of Primary and Secondary Education Directorate of Secondary Education.

Nurhadi & Senduk, A.G. (2003). *Contextual Learning (Contextual Teaching and Learning / CTL) and its Application in the CBC*. Malang: State University of Malang.

Prawiradilaga, D.S. (2008). *Principles of Learning Design (Instructional Design Principles)*. Jakarta: Kencana Prenada Media Group.

Tessmer, M. (1993). *Planning and Conducting Formative Evaluations: Improving the Quality of Education and Training.* London: Kogan

Trianto. (2010). *Models of Innovative Learning Oriented Constructivistic*. Jakarta: Performance Library.

Warsita, B. (2008). *Learning Technology Platform and Applications*. Jakarta: Rhineka.