Development of Teaching Materials Based on Case Method in Even Semester Chemical Materials Class XI SMA

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Abstract. This study aims to develop teaching materials based on the case method for chemistry class XI even semester that are valid and suitable for use in learning. This research is a development research. The analysis technique used is a qualitative descriptive analysis technique. The results of this study are teaching materials based on case methods that have been developed based on designs that have been designed. based on the assessment of material experts from 3 lecturers and five chemistry teachers, the average score of all aspects of eligibility based on BSNP is 3.73 with valid criteria and does not need to be revised. Thus it can be concluded that the case method-based teaching materials are very suitable for use in the learning process.

Keywords: Teaching Material, Case Method, Chemistry.

1 Introduction

Chemistry learning not only emphasizes understanding of concepts, but students are also required to be able to apply science concepts to solve science-related problems in everyday life. So, the benefits of successful learning chemistry will be felt more if the learning can be applied to the realities of life[1]. A deep understanding of chemical concepts and their application in everyday life can be realized if students have abilities that cover both of these aspects, namely chemical literacy skills[1].

In chemistry learning, students are expected to be able to understand chemical concepts to solve problems by building their own knowledge. Related to chemical literacy and familiarized with the final evaluation that demands a mindset in development to achieve better educational goals[2].

The learning process that emphasizes the problem-solving process can be done one way with case-based learning. In the case-based learning method students play a major role in solving cases or problems[3]. Solving the case (case method) is one way with a case study approach

AISTEEL 2023, September 19, Medan, Indonesia

DOI 10.4108/eai.19-9-2023.2340429

that explores through examples of phenomena that occur so as to explore the possible effects of learning and teaching, as an empirical and holistic investigation[4].

The case method is the best way to prepare students for leadership challenges and through a dynamic process of exchanging perspectives, fighting and defending points, and building on one another's ideas, students become proficient in analyzing problems, exercising judgment, and making difficult decisions[5]. Learning through real-life cases and equipping students with the right learning syntax can help students develop critical thinking skills or higher-order thinking skills (HOTS)[6].

One of the most important factors in learning is teaching materials, where teaching materials are important factors that must be analyzed, cared for, studied, and prepared as material that can be accepted by students[7]. Teaching materials are prepared with the aim of providing learning materials that are in accordance with the demands of the curriculum that pay attention to the needs of students which include the characteristics and environment of students[8].

Previous research on the use of the case learning method has been carried out by [5] stated that the case method-based learning through the zoom meeting application had an effect on students' understanding of concepts, then research by [9] states that students like learning that applies the case method using audio-visual media because it is more fun, interesting, and can make students understand the material more easily, this can be seen from the curiosity of students who increase in learning and they are more motivated to study hard. Other research shows that the results of student and teacher responses to the development of the case method-based science module are stated to be very good for use as teaching materials in schools[10]. Much research has been conducted on z-case method-based learning, but no one has yet integrated it into high school chemistry teaching materials and measured students' chemical literacy skills and motivation

Based on the description above, the researcher is interested in developing teaching materials with the title: “Development of Case Method-Based Teaching Materials in chemistry material for class XI even semester”.

2 Method

The type of research used in this research is Research and Development (R&D). The subjects of this study were three lecturers from Medan State University and five chemistry teachers from Langsa City. R&D research is a research method used to develop a particular product. In this study, the product developed was a case method-based teaching material for even semester XI grade chemistry. The development model used was the ADDIE (Analysis, Design, Development, Implementation and Evaluation) development model. Of the five stages of the ADDIE model, only 3 stages were adapted in this study, namely Analysis, Design and Development. A more complete procedure in this study is presented in Figure 1.

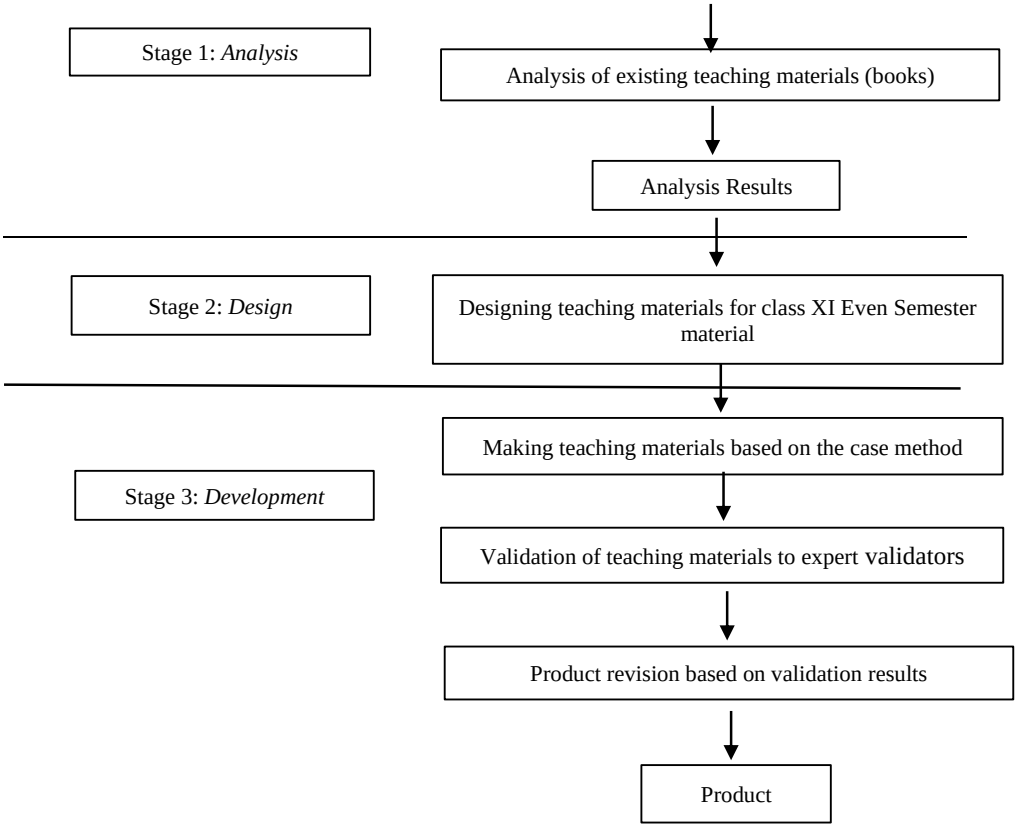

Fig. 1. Product Manufacturing Design Procedure.

The data collection instrument used in this study was a validation questionnaire based on eligibility standards according to the National Education Standards Agency (BSNP) which included content feasibility, language eligibility, presentation feasibility and graphic feasibility. This questionnaire was given to material expert lecturers and to high school chemistry teachers in Langsa City. The scale used in the case method-based teaching material validation questionnaire is a Likert scale with a range of 1-4 with answers given from strongly disagree to strongly agree. the data analysis technique used is a quantitative descriptive technique and a qualitative descriptive analysis technique. The average value of the feasibility aspects of teaching materials based on the case method is then interpreted according to the categories in Table 1.

Table 1. Teaching Materials Validity Criteria.

Average	Validity Criteria
3.26 – 4.00	Valid and does not need to be revised (very feasible)
2.51 – 3.25	It is quite valid and does not need revision

1.76 – 2.50	Less valid and partially revised
1.00 – 1.75	Invalid and need total revision

3 Result and Discussion

This type of research is Research and Development (R&D). the development research process uses the ADDIE model which consists of Analysis, Design and Delopment.

3.1 Analysis

At this stage, the researcher conducted an initial needs analysis, namely interviews with five chemistry teachers in Langsa City. Obtained from these interviews: (1) the average literacy value of students in the 2021 National Assessment is still below the set minimum competency standards (1.82); (2) in chemistry learning the teacher rarely gives practice questions in the form of chemical literacy questions; (3) the teaching materials used do not contain literacy questions and (4) the learning motivation of students is still low. From the results of the interviews, it is necessary to innovate teaching materials which are expected to improve students' literacy skills and be more motivated in learning chemistry.

The next step, the researcher analyzed the chemistry teaching materials used in several high schools in Langsa City, namely two chemistry books for class XI. The book was coded A and B. The researcher analyzed the book using the BSNP instrument with an assessment component consisting of content feasibility, language feasibility, presentation feasibility and graphic feasibility. The following presents the results of the percentage analysis of the feasibility of chemistry books **(Figure. 2).**

Fig. 2. Percentage of Feasibility Analysis Results for Two Chemistry Books According to BSNP

3.2Design

At this stage a product is made, namely teaching materials based on the case method. the activities carried out are making designs, compiling material so that it is systematic and in accordance with predetermined indicators, looking for case method references that are in accordance with the material and directive questions and preparing evaluation questions. The design of teaching materials based on the case method can be seen in **Figure 3.**

Fig. 3. Teaching Material Design

3.3 Development

After the case method-based teaching materials have been prepared, the next step is to conduct a feasibility test of teaching materials to material experts, namely chemistry education lecturers at Medan State University and high school teachers in Langsa City by using a validation questionnaire based on eligibility according to BSNP. This feasibility test was carried out to find out whether the case method-based teaching materials that had been developed were feasible or not used.

Content Eligibility

The feasibility of the content contains 4 aspects that are developed including the suitability of the material with KD, the accuracy of the material, the updating of the material and encouraging curiosity. The results of the analysis of teaching materials based on the case method that have been developed based on the feasibility aspect of the content by lecturers and teachers as expert validators can be seen in **Figure 4.**

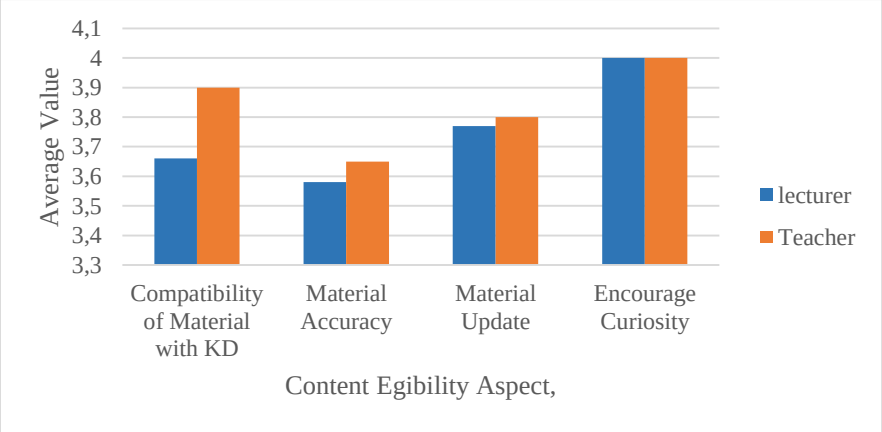

Fig. 4. Graph of Feasibility Analysis Results of Teaching Materials Content

The content feasibility aspect is in accordance with the modified BSNP standard, there are 4 indicators. Based on the results of the analysis, the feasibility value of the content on the aspect of encouraging curiosity has the highest score from both lecturers and teachers' material experts, namely 4.00 with a valid category without revision. This shows that the case method and questions presented can encourage greater student curiosity, because the case method presented is a case that occurs in everyday life. Other indicators, namely the suitability of the material with KD, the accuracy of the material and the updating of the material have an average value even though the results differ from lecturers and teachers, but all of them have a value above 3.25 which indicates a valid category without the need for revision (very feasible). Details of the results of the feasibility analysis of the contents of teaching materials based on the case method.

The average value of the validation results for the feasibility aspect of the content of teaching materials based on the case method developed from material experts for lecturers is 3.75 and teachers are 3.84. These values are both included in the valid category without revision (very feasible) which means that the case method-based teaching materials developed are in accordance with the BSNP standards and are very suitable for use in chemistry learning class XI even semester.

Language Egibility

The results of the analysis of teaching materials based on the case method that have been developed based on aspects of language feasibility by lecturers and teachers as expert validators can be seen in Figure 5.

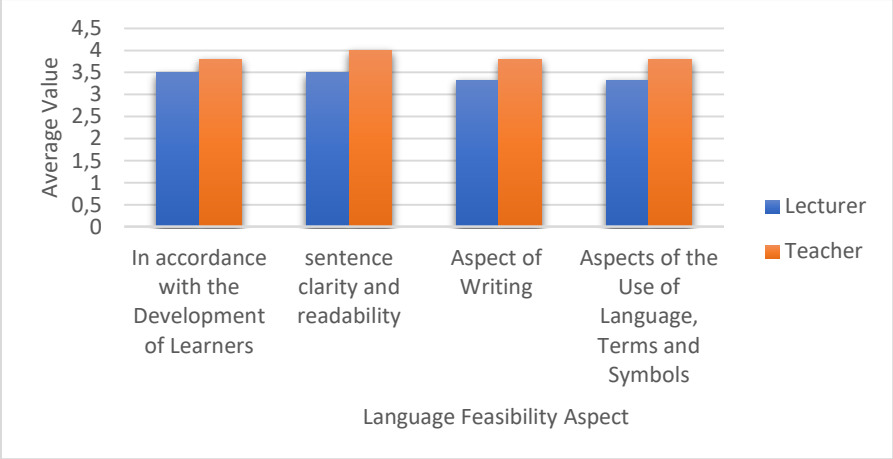

Fig. 5. Graph of Language Feasibility Analysis Results for Teaching Materials developed

Aspects of the feasibility of the language used include four indicators, namely aspects according to the development of students, clarity of sentences and levels of readability, aspects of writing the contents of teaching materials and aspects of language use, terms and symbols. The highest aspect is the clarity of sentences and the level of legibility, which is 4 from the teacher, while from the lecturer it is the same as the assessment of aspects according to the development of students, namely 3.40. Even though the average scores of lecturers and teachers differ greatly, both scores are in the valid category without the need for revision. This shows that the case method-based teaching materials that have been developed have good sentence clarity and readability and are expected to make it easier for students to easily understand the contents of the teaching materials. The results of the analysis for other aspects, namely in accordance with the development of students, aspects of writing the contents of teaching materials and aspects of language use have an average value above 3.25. These three aspects are included in the valid category without the need for revision (very feasible).

The average score of all aspects of language feasibility of teaching materials based on the case method that has been developed is 3.41 for lecturers and 3.85 for teachers. Both are included in the valid category and do not need revision (very feasible). These results indicate that based on the aspect of language feasibility the teaching materials developed are very suitable for use in chemistry learning for class XI even semester.

Eligibility of Presentation

The feasibility of the presentation used includes four aspects of assessment, namely presentation techniques, presentation support, module presentation and evaluation. The results of the feasibility analysis of presenting teaching materials based on the case method are presented in **Figure 6**.

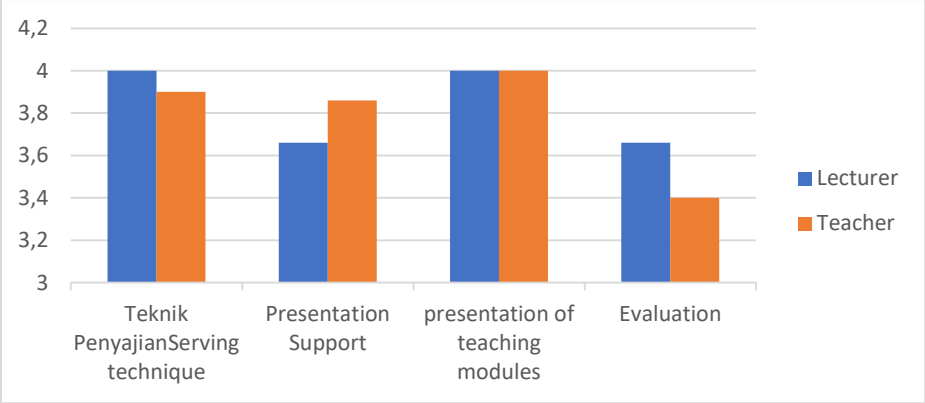

Fig. 6. Graph of Feasibility Analysis Results for Presentation of Teaching Materials developed

The results of the analysis of teaching materials based on the case method that have been developed based on the feasibility of presentation by lecturers and chemistry teachers as expert validators who have the highest average score are in the aspect of presentation of teaching modules, namely 4.00 from lecturers and teachers, including valid and unnecessary categories there is a revision. This shows that the completeness of the teaching modules contained in the developed teaching materials which include table of contents, concept maps, glossary and bibliography are complete in the teaching module. The average value of other presentation feasibility aspects, namely presentation techniques, presentation support and evaluation, has a value above 3.25. these three aspects also have a valid category and do not need revision (very feasible) as well.

All aspects of the feasibility of presentation have an average score of 3.83 from the lecturer and 3.79 from the teacher, both of which are valid categories without the need for revision. This shows that based on the feasibility aspect of presenting teaching materials based on the case method that has been developed it is very suitable for use in chemistry learning for class XI even semester.

Graphic Eligibility

The graphical feasibility aspects used include three aspects of assessment, namely module size, module cover design and module content design. The results of the analysis of teaching materials based on the case method developed on the graphical feasibility aspect can be seen in Figure 7.

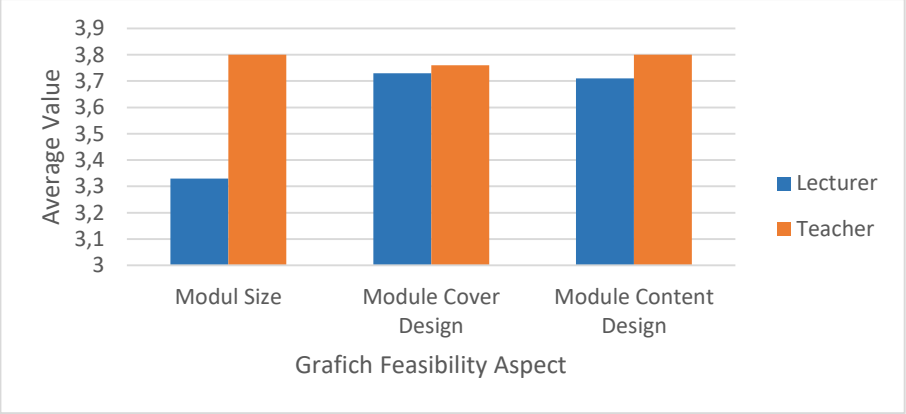

Fig. 7. Graph of Feasibility Analysis Results for Developed Teaching Materials Graphics

Based on the results of the analysis that has been carried out on the graphical feasibility aspect, the highest average score from the teacher is the module content design aspect and the module size is 4.00. This shows that the design of the module content and the size of the module is good and is in accordance with the standards set. This shows that the cover of the module is in accordance with both the title and the picture. All indicators on this aspect of graphic feasibility have a value above 3.25, including the valid category without revision (very feasible). The three indicators on the graphical feasibility aspect of teaching materials based on the case method have an average score of 3.59 from lecturers and 3.78 from teachers which are in the valid category without the need for revision. This shows that based on the feasibility aspect the teaching materials developed are very suitable for use in chemistry learning for class XI even semester.

Based on the feasibility aspects of the content, language, presentation and graphics above, the indicator scores for each material expert are summed up and the average total score (mean total score) of lecturers and teachers is calculated (**Table 2**).

Table 2. Average Validation Score from Chemistry Lecturers and Teachers.

Criteria	Score		Average	Valid Criteria
	Lecture	Teaching		
Content Eligibility	3.75	3.84	3.79	Valid and does not revisison
Language Egibility	3.41	3.85	3.63	Valid and does not revisison
Serving Feasibility	3.83	3.79	3.81	Valid and does not revisison
Grafhic Worthiness	3.59	3.78	3.68	Valid and does not revisison
Average			3.73	Valid and does not revisison

The results of the feasibility of the chemistry teaching materials developed based on the BSNP questionnaire which have been modified from material experts, namely three chemistry lecturers and 5 high school chemistry teachers in Langsa City, obtained an overall validation aspect average score of 3.73. This shows that the case method-based chemistry teaching

materials have valid criteria without the need for revision and are suitable for use in chemistry learning for class XI even semester.

4 Conclusion

Based on the results of the data analysis, it can be concluded that the case method-based chemical teaching material developed has an average content feasibility aspect validation result of 3.79; aspect of language feasibility on average 3.63; the presentation feasibility aspect is 3.81 and the graphical feasibility aspect has an average value of 3.68. All of these specs are in the category of valid without revision. The average value of all aspects of eligibility based on the BSNP is 3.73 with valid criteria and does not need revision. This shows that the case method-based chemistry teaching materials are appropriate for use in chemistry learning for class XI even semester.

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