

## ANALYSIS OF THE NEED FOR RENEWAL OF MATHEMATICS TEACHING MATERIALS IN VOCATIONAL HIGH SCHOOL

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### Abstract

Teaching materials are an important in the implementation of education. Teaching materials have to the needs and attract students' interest in learning. Teaching materials must also be able to assist teachers in delivering subject matter. From the results of observations of teaching materials in vocational students, researchers found data that the delivery of materials in teaching materials was quite monotonous. The presentation of this monotonous material does not attract students' interest in using teaching materials. This research is a descriptive qualitative research. The place of this research is a vocational high school (SMK) State 3 Metro, Lampung Province. The research subjects used were 8 students and 3 mathematics teachers at SMKN 3 Metro. The research instrument used was a questionnaire sheet and an interview guide. The data analysis technique uses the Miles and Huberman stages, namely: data reduction, data presentation, and drawing conclusions. Based on result and discussion show that materials teaching mathematics for vocational students are needed novelty of: 1) systematic preparation, 2) materials adapted to the characteristics of vocational students, 3) presentation of teaching materials adapted to technological developments, 4) use of technology to attract students' interest, 5) the form of teaching materials that are more practical and easy to use.

**Keywords:** Teaching Materials, Novelty, Vocational High School.

### Abstrak

Bahan ajar merupakan bagian penting dalam pelaksanaan Pendidikan. Bahan ajar yang baik harus bisa memenuhi kebutuhan dan menarik minat peserta didik dalam belajar. Bahan ajar juga harus dapat membantu guru dalam menyampaikan materi pelajaran. Dari hasil observasi bahan ajar pada siswa SMK, peneliti menemukan data bahwa penyampaian materi pada bahan ajar cukup monoton. Penyajian materi yang monoton ini kurang menarik minat siswa dalam menggunakan bahan ajar. Penelitian ini merupakan penelitian kualitatif deskriptif. Tempat penelitian ini adalah sekolah menengah kejuruan (SMK) Negeri 3 Metro Provinsi Lampung. Subyek penelitian yang digunakan adalah 8 orang siswa dan 3 orang guru matematika SMKN 3 Metro. Instrumen penelitian yang digunakan adalah lembar angket dan pedoman wawancara. Teknik analisis data menggunakan tahapan Miles dan Huberman yaitu : reduksi data, penyajian data, dan penarikan kesimpulan. Berdasarkan hasil analisis data dan pembahasan dapat disimpulkan bahwa diperlukan pembaruan bahan ajar matematika siswa SMK berupa : 1) sistematika penyusunan berbeda, 2) materi yang disesuaikan dengan karakteristik siswa SMK, 3) penyajian bahan ajar yang disesuaikan dengan perkembangan teknologi, 4) penggunaan teknologi untuk menarik minat siswa, 5) bentuk bahan ajar yang lebih praktis dan mudah digunakan.

**Kata kunci :** Bahan Ajar, Kebaruan, Sekolah Menengah Kejuruan

## INTRODUCTION

One of the tools needed in the learning process is teaching materials. Based on PP No. 57 Tahun 2021 concerning National Education Standards states that facilities in education are everything that is used as tools and equipment to assist in achieving learning objectives. The means used in learning to meet the principles of being active, creative, collaborative, fun, and effective. One of the tools needed to achieve learning objectives is teaching materials. The

teaching materials used must be able to meet the principles of facilities in learning, namely active, creative, collaborative, fun, and effective. From PP No. 57 it can be seen the importance of the role of teaching materials to achieve learning objectives. One of the important factors in the effectiveness of learning, especially at higher education levels is teaching materials. Teaching materials can be in the form of writing such as handouts, books, modules, worksheets, brochures, pamphlets, wallcharts, or implied materials such as videos. Internet CDs/films such as ' , radio, cassette, and computer services (Arsanti, 2018). From the results of Arsanti's research, it can be seen that teaching materials have an important role to achieve optimal learning outcomes.

Good teaching materials must be able to meet the needs and attract students' interest in learning. Teaching materials must also be able to assist teachers in delivering subject matter. Textbooks are an important part of the implementation of education. Through textbooks, teachers will find it easier to carry out learning and students will be more helpful and easier to learn. Textbooks can be arranged according to the needs and materials to be provided (Ina Magdalena, 2020). One of the subjects considered difficult by students is mathematics. Mathematics is considered by students as an uninteresting subject. This can happen because in learning mathematics students encounter many formulas and abstract questions. In addition, the monotony of delivering mathematics subject matter is also one of the factors causing students to dislike mathematics. One of the reasons for the unattractiveness of mathematics teaching materials for SMP/MTs students is using complex teaching materials. The form needed teaching materials to attract students is to develop innovative teaching materials. (Ismu Fatikhah, 2015). From the results of Ismu Fatikhah's research, it can be seen that the presentation of material in teaching materials needs to be presented attractively to reduce the complexity of the mathematical material being studied.

To find out the delivery of mathematics material can be seen in the learning materials used by the teacher. Therefore, the researchers made observations about the mathematics teaching materials used by teachers at the vocational high school (SMK) level. From the results of observations of teaching materials in vocational students, researchers found data that the delivery of materials in teaching materials was quite monotonous. The presentation of this monotonous material does not attract students' interest in using teaching materials. Education in Indonesia is only limited to the theory that is mastered and lacks application in

life. Many students are innovative that mathematics is difficult and learning is not. This will cause students' motivation to learn mathematics to be small or low (Oktaviani, 2020). From the results of Oktaviani's research, learning mathematics is considered monotonous by students because the presentation is less attractive. This causes low student motivation in learning mathematics. In addition to observing the teaching materials, the researchers also conducted interviews with teachers regarding the condition of the teaching materials used. From the results of this interview, data obtained that there are still many materials about teaching materials that have not been adapted to the level of vocational students. For SMK students, the materials and questions needed are related to the implementation of the material at the vocational level taken by students. Vocational-related questions are considered more interesting for students to learn.

In addition to presenting teaching materials, in learning mathematics, it is also necessary to use existing technology. The teaching materials used can be made interesting if they are made by utilizing technological developments. Advances in technology and information can help reduce problems in teaching materials. Another problem with teaching materials is that there is no use of advances in technology and information. The use of good teaching materials can reduce student dependence on teachers and provide opportunities for the effective use of teaching materials. The use of printed books for learning is not optimal, because students record material that already exists in textbooks (Saluky, 2016). In Saluky's opinion, it is seen that it is necessary to use technology in presenting mathematics learning materials. This is because the use of mathematics teaching materials does not provide opportunities for students to be able to study independently.

From the results of observations and interviews about the conditions of teaching materials at the SMK level, it can be said that there are still problems with the conditions of teaching materials used in learning mathematics. The teaching materials used so far have not been able to meet the principles of teaching materials in learning following PP No. 57 of 2021, namely active, creative, collaborative, fun, and effective. Existing teaching materials cannot be said to be effective because there are still materials that have not been adapted to the SMK level. In addition, the display of teaching materials also cannot be fun because it has not been able to attract students' interest in learning. Learning in vocational schools does not discuss topics that are appropriate to the vocational field. Especially mathematics, based on

the observation of electronic school books (BSE) the material does not contain applied mathematics for vocational students. This causes students' inability to achieve competence because the material is not related to their major. Mathematics learning is still common, especially in the fields of technology and engineering expertise, although some basic skills are contextual (Rahma Yuliasuti, 2021). From the results of Rahma Yuliasuti's research, it can be seen that the mathematics material at the SMK level is not following the competencies of the existing majors. Materials that have not adjusted to the condition of students are one of the factors that cause the use of less effective teaching materials.

Based on the background of the problem, the researcher will conduct research on the need for novelty of teaching materials at the vocational high school (SMK) level. This study will explore the novelty needed to complement the weaknesses of existing teaching materials, especially teaching materials at the SMK level. The purpose of this study was to describe the need for the novelty of teaching materials, especially at the SMK level.

## METHODS

This type of research is descriptive qualitative research. This research took place at the state 3 Metro vocational high school (SMK) in Lampung Province. The research subjects used were 8 students and 3 mathematics teachers at SMKN 3 Metro. The research instrument used was a questionnaire sheet and an interview guide. Data collection techniques carried out are:

1. Selecting research subjects consisting of 4 students of class X and 4 students of class XI at SMKN 3 Metro.
2. Choose 3 math teachers at SMKN 3 Metro.
3. Provide a questionnaire on the need for the novelty of teaching materials to research subjects.
4. conducting interviews with research subjects related to the answers given to the questionnaire.
5. Analyzing the results of questionnaires and interviews of teachers and students.
6. Summarize the novelty of the teaching materials needed.

The data analysis technique uses the Miles and Huberman stages, as follows:

1. Reduction Stage, at this stage the analysis of data that has been obtained from questionnaires and interviews are carried out. Data that does not provide information about the need for new teaching materials will be discarded or not used.
2. Data Presentation Stage. After data reduction is done, the new data obtained from the teaching materials will be presented in a descriptive narrative.
3. Conclusion Drawing Stage. The last stage of analyzing the data is concluding the novelty of teaching materials found from the results of questionnaires and interviews.

## RESULTS AND DISCUSSION

This research took place at SMK Negeri 3 Metro with data sources 3 mathematics teachers and 8 students. The data collection was carried out in March 2022. Each teacher and student was given a questionnaire containing 15 questions about the condition of the teaching materials used in learning mathematics. After filling out the questionnaire, interviews were conducted with the data sources to ensure complete answers given to the teaching material needs analysis questionnaire. The following is Table 1. Recapitulation of the results of the questionnaire analysis of teaching material needs.

**Table 1. Recapitulation of the Results of the Analysis of Teaching Material Needs Questionnaire**

No.	Questions	Data Source											
		G1	G2	G3	S1	S2	S3	S4	S5	S6	S7	S8	
1.	Suitability of Teaching Materials With Curriculum	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
2.	Ease of use of Teaching Materials	Y	T	T	Y	Y	T	T	T	Y	Y	T	T
3.	Achievement of Learning Goals	Y	Y	T	Y	Y	Y	T	Y	T	T	T	T
4.	The Suitability of Teaching Materials With Students' Conditions	T	T	Y	T	T	T	Y	T	Y	T	Y	Y
5.	Systematics of Teaching Materials	Y	Y	Y	Y	T	Y	T	Y	Y	Y	Y	Y
6.	Ease of Teaching Materials	Y	T	T	Y	Y	T	T	T	T	T	T	Y
7.	Use of other Teaching Materials	Y	Y	T	Y	Y	Y	Y	T	Y	T	T	T
8.	Use of Media/Props	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
9.	There are have the advantages of teaching materials	Y	T	Y	Y	Y	T	T	T	T	Y	Y	Y

10.	There are have weaknesses in teaching materials	Y	Y	T	T	T	Y	Y	Y	Y	T	T
11.	Student Interest in Teaching Materials	T	T	T	Y	Y	T	T	T	T	Y	Y
12.	Technology Suitability	T	T	T	T	T	T	T	T	Y	Y	Y
13.	Novelty of Teaching Materials	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
14.	Systematics for Compiling Different Teaching Materials	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
15.	Technology Needs in Teaching Materials	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Explanation: Y = Yes, T: No

Based on the results of the questionnaire in Table 1, data were obtained about the condition of the existing teaching materials. From this questionnaire data, interviews were conducted to obtain a complete explanation of the condition of the teaching materials. Based on the analysis of questionnaires and interviews obtained as follows:

1. Existing teaching materials are following the K.13 curriculum and can help achieve learning objectives.
2. In the use of teaching materials, there are still difficulties and are not under the conditions of vocational students.
3. The material in teaching materials is still considered difficult by students so teachers use other supporting materials such as modules and e-books as well as media such as learning videos.
4. In teaching materials, there are advantages, namely a good systematic arrangement and completeness of teaching materials.
5. Weaknesses in teaching materials, namely, long-winded in the delivery of materials and have not attracted students' interest in learning mathematics.
6. Teaching materials have not been adapted to existing technological developments.
7. There needs to be a systematic preparation of different materials.

12.	Apakah bahan ajar sudah menyesuaikan dengan perkembangan teknologi yang ada ?		✓	Bahan ajar belum menyesuaikan dgn perkembangan teknologi sekarang. hanya ada buku / bahan ajar paket.
13.	Apakah diperlukan kebaruan dalam bahan ajar ? Jelaskan !	✓		Perlu kebaruan dlm bahan ajar.
14.	Apakah diperlukan sistematika penyusunan bahan ajar yang berbeda ? Jelaskan !	✓		dapat diperlukan sistematika yg berbeda agar dapat menarik minat siswa.
15.	Apakah dibutuhkan penyajian bahan ajar yang menggunakan teknologi ?	✓		Sangat dibutuhkan penyajian bahan ajar menggunakan teknologi.

Figure 1. Sample Questionnaire Results from Teachers

The use of teaching materials in mathematics learning is very important to be optimized. Teaching materials occupy a position as the main teaching materials that support the curriculum. The main teaching materials are adjusted to the curriculum. Additional teaching materials will help add to the curriculum and deepen curriculum content (Yayuk, 2019). Mathematics subjects that feel difficult, can be reduced if learning using teaching materials that are following the conditions of students.

The material in teaching materials that are not following the characteristics of vocational students can be one of the factors that cause students to be uninterested in learning mathematics. Vocational High School students need more applied mathematics material in their field. Teaching materials developed by teachers certainly contain goals and benefits for teachers and students. The objectives and benefits of teaching materials are: 1) the provision of teaching materials that meet the appropriate requirements, adjustments to student needs, namely teaching materials that are following the characteristics of the curriculum and student environment; 2) superiority of teaching materials for teachers, namely materials that are following the curriculum and following student learning needs, building effective learning communication; 3) beneficial for students, namely learning activities become more interesting, independent and interesting learning opportunities (Lestari, 2018).

The interesting systematic arrangement of teaching materials can also help teachers to attract students' interest in learning. Teaching materials must be made as attractive and short as possible and easily accessible. This is due to the nature of children who are easily bored with something that is done continuously, such as reading. Long and dense writings or texts

make children tend to be more bored, especially if they are not accompanied by something more colorful such as animations, photos, and so on. Short and colorful teaching materials can attract students' attention and they will be curious about the next material. Teaching materials must also contain simple sentences so that they are easily accessible (Mardianto, 2021). In the use of teaching materials, students have not been able to get optimal learning outcomes from the material being studied. The use of additional materials or learning media is needed by teachers to facilitate the delivery of materials. Learning media has many doubles, namely placing abstract objects into concrete, and helping to explain and understand difficult things verbally. Through the use of media, students are more creative in solving mathematical problems (Susanti, 2020).

Teachers have various ways so that students can understand and communicate with teachers, including learning methods, learning approaches, learning media, and others. The development of science and technology in the current era encourages the achievement of efforts to use technology in learning. Through learning media, teachers can now explain concrete material and lesson outlines that can be easily learned and eliminate verbalism (Hernandes, 2016). Learning media created by teachers can be adapted to existing technological developments. Students enjoy studying mathematics for several reasons, namely: mathematics material that is closely related to the vocational chosen by students, learning can be used to be interesting and bold without having to bring a textbook, including student discussion materials for groups, formative test answer keys in the form of videos, which This causes students to be able to learn independently, evaluate the complete evaluation of the answer keys available in bold and attractive so that students are free to choose and can be repeated until they find the right answer (I Wayan Sumandya, 2022).



**Figure 2. Sample of Data Collection Documentation by Interview**



From the discussion, it can be said that a teaching material is needed in the form of 1) a different arrangement systematic, 2) material that is adapted to the characteristics of students, 3) the presentation of teaching materials that are adapted to technological developments, 4) the use of technology to attract students' interest, 5) more practical teaching materials and forms that are easy to use.

## CONCLUSION

Based on the results of data analysis and learning, it can be obtained that mathematics learning materials for vocational students are needed in the form of 1) systematic preparation, 2) materials adapted to the characteristics of vocational students, 3) presentation of teaching materials adapted to technological developments, 4) use of technology to attract students' interest, 5) the form of teaching materials that are more practical and easy to use.

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