



## Development of Audio and Video System Learning Modules for Light Vehicle Engineering Vocational School: 4D Model

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### Keywords

Module  
Development  
Audio System

### Abstract

*This research aims to develop a module on the subject of electrical maintenance for class XI light vehicles as a learning medium at SMK Muhammadiyah 3 North Klaten. The development of this module is to make it easier for students to carry out learning about light vehicle electrical maintenance. This research includes research that uses the Thiagarjan development research model. In learning development, a model called Four-D (4D) is used, namely, Define, Design, Develop, and Disseminate. The data analysis technique used analyzes quantitative data obtained from expert validation, teacher support, and field trials. Quantitative data in the form of numbers resulting from calculations is added up and then compared with the maximum score to obtain a percentage of module feasibility results. The research results show that the audio and video system modules are: (1) with a percentage of material expert assessment scores of 91.6%. (2) the percentage of media expert assessment scores is 87.0%. (3) the percentage of teacher assessment scores was 95.3% (4) the percentage of small-scale students was 74.6%. (5) the percentage of large-scale students scored 78.2%. Based on the data above, it can be concluded that this audio and video system module is very suitable for use.*

### Introduction

Education is an important component that can be useful for improving the quality of human resources. Therefore, it is necessary to take a systematic and systematic approach to humanity to identify and develop individuals who are capable, inventive and competent in facing the obstacles that confront them. Education is very important for humans in all aspects (Amaliyah & Rahmat, 2021). Law No. 20 Article 1 of the 2003 National Education Law states that education is a fundamental effort and plan to create a learning environment and learning composition so that students, society, nation and state can develop self-control, personality, intelligence, noble character and skills. In article 1 of Law no. 20 of 2003, education covers the objectives of Indonesian education. Meanwhile, according to Hidayati et al (Hidayati & Pardjono, 2018) Education is an important factor in efforts to improve the quality of human resources from bad to better.

One of the Government's efforts to improve the quality of human resources is through Vocational High Schools. Vocational High School (SMK) is a final level secondary school which is equivalent to Senior High School. The difference is that SMK has a field of expertise or vocation. As explained by Minister of National Education Regulation No. 22 of 2006, it is to improve the knowledge, personality, noble character and skills of students so that they are able to live independently or be used for further education in accordance with their vocation. The aim of education is to brighten the life of the nation. Realizing the goals of vocational education is not easy and simple. (Rabiman et al., 2020b) The function of national education is to develop abilities, shape national identity and civilization, in order to develop the potential of students to become devout people who believe in Allah SWT. Have a personality that has noble character, is healthy, knowledgeable, capable, creative, independent and becomes a responsible, democratic citizen to achieve these goals. According to Saputra & Priyanto (Fajri et al., 2019) this program is designed to help students develop self-confidence, self-esteem, leadership skills, and the ability to manage their own lives.

Vocational Schools are developed from national education goals and graduate profiles in the formulation of competency areas. The aim of Vocational Schools is to produce skilled workers who are able to meet the needs of the business or industrial world and can realize their potential in the fields of science, technology and art. However, in fact, according to the Ministry of Education and Culture (2012), due to the lack of graduate transversal skills, the capacity of specialist graduates is still not up to par compared to the real needs of graduates (Ratnawati et al., 2019).

The audio system subject is one of the main subjects that must be passed by class XI students of SMK Muhammadiyah 3 North Klaten in the Light Vehicle Engineering Examination (TKR) program. In the field of electricity, it explains how an audio system works by collecting electricity, repairing the audio system, and analyzing the components of the audio system. The sound system from Light Vehicle Engineering Expertise (TKR) processes signals and sound and raises the sound level so that some sound can be present in the audio video system. Audio and video system expertise in the field of light vehicle technology is studying the working principles of audio video systems, studying the installation and operation of audio video systems, this expertise represents a person who believes and is devoted to God Almighty, has noble character. character, physically and mentally healthy, a stable and independent personality and a sense of social and national responsibility

Vocational school development graduation standards are based on national education goals and profiles completed in regional competency development. The aim of Vocational Schools is to produce skilled workers who are able to meet the needs of the business or industrial world and can realize their potential in the fields of science, technology and art. Graduate Competency Standards (SKL) in Vocational Schools can be used to achieve the following goals: having the mental capacity to discover one's identity, guaranteeing a person's knowledge from the fields of technology, science and society and having skills that are in line with development needs, productive skills that in accordance with job and business competencies. According to Purwanto & Rabiman (Purwanto & Rabiman, 2018) that vocational high schools have a mission to create skilled workers according to certain fields.

The audio system subject is one of the main subjects that must be passed by class XI students of SMK Muhammadiyah 3 North Klaten in the Light Vehicle Engineering Examination (TKR) program. In the field of electricity, it explains how an audio system works by collecting electricity, repairing the audio system, and analyzing the components of the audio system. The

sound system from Light Vehicle Engineering Expertise (TKR) processes signals and sound and raises the sound level so that some sound can be present in the audio video system.

In learning at SMK Muhammadiyah 3 North Klaten, especially in the audio and video system, most teachers only use textbooks in the learning process. A common problem faced by teachers in teaching materials is that teachers provide teaching materials or material presented by students that is too broad or small, and the type of learning material does not match the students' desired abilities. This subject only uses textbooks, and books are often changed every semester or even when new courses are changed. Apart from that, SMK Muhammadiyah 3 North Klaten does not yet have a specific audio and video system competent learning media module, there is a learning environment for audio and video system trainer simulators, but nothing specific.

Learning at vocational school students require modules according to the circumstances and learning strategies used by educators. The use and application of modules that support learning is the property of every student and educator, modules not only improve the efficiency and quality of learning. Modules are learning materials that are prepared systematically and interestingly which include material content, methods and assessments to achieve competencies that students can use independently Handoyono, Hadi (Handoyono & Hadi, 2018). This is supported by research by Haris Abizar (Abizar, 2016) which shows that the introduction of modules can improve learning outcomes. According to Johan (Johan et al., 2019) learning is learning from misunderstandings towards understanding and acquiring knowledge. Learning materials can be understood, various kinds of materials are arranged systematically so that students can learn on their own and are made according to a curriculum that suits their needs (S.Sirate & Ramadhana, 2017). Quality learning modules can be used to improve learning outcomes. According to Rabiman (Rabiman et al., 2020a) in creating a quality learning module, you must pay attention to the functions required in the learning module.

When researchers conducted field observations and interviews with teachers supporting the electrical maintenance of Class can use it independently, so learning is still focused on the teacher. Therefore, it is necessary to develop an audio and video system learning module as learning material in the light automotive electrical maintenance class at SMK Muhammadiyah 3 North Klaten Class XI so that the module can be used as learning material. In order to produce modules that can be used, then these modules must be developed in accordance with the criteria for good modules and validated by experts. Developing learning modules also requires responses from users. The researcher's hope in this module is that students can learn independently.

## **Method**

The method in this research is Research and Development (R&D). Based on the opinion (Thiagarajan et al., 2016) states that the research and development method, or R&D is a research model used to create certain products and test their effectiveness. The process of making certain products and testing them as a research and development method. Researchers are moving towards the 4D development model, where this development model consists of 4 stages, namely 1).Define (Definition), 2).Design (Planning), 3).Development (Development), and 4).Disseminate (dissemination).

The module validation assessed in this research is the respondents, namely two subject lecturers and a media expert who must be equipped with data collection tools to guarantee data collection, in addition to material and media experts, subject teachers and student responses. also present. The subjects of this research are subject matter experts, media experts, subject teachers and research students. The students in this research were class XI TKR students at SMK Muhammadiyah 3 North Klaten. The purpose of validation is to obtain results or collect data from a module so that the module can be distributed to students.

The assessment options using a Likert scale in the audio and video system module evaluation questionnaire include number 4 meaning: very good, number 3 meaning: good, number 2 meaning: not good, while number 1 means: not good. In this evaluation, it is estimated that the experts who carry out the module evaluation are media experts, material experts, subject teachers, and students who provide answers or answers to the audio and video system modules. Information obtained from the survey is processed using data analysis to determine the quality of the educational tools that will be developed. The data analysis technique used is quantitative descriptive analysis technique.

The data analysis technique used in this research is a quantitative descriptive analysis technique. A way to describe the information collected without drawing conclusions that apply to the general public with qualitative data and quantitative data. Qualitative Data using *Scalelikert* with a score of 1-4. *Scalelikert* chosen to measure someone's opinions and perceptions. Quantitative data is obtained from qualitative data obtained from descriptions, which are converted into assessment points in the following table:

**Table 1.** Assessment Score

| Penilaian | Skor | Keterangan  |
|-----------|------|-------------|
| SB        | 4    | Sangat Baik |
| B         | 3    | Baik        |
| KB        | 2    | Kurang Baik |
| TB        | 1    | Tidak Baik  |

The steps for analyzing learning quality data are carried out as follows:

$$\bar{x} = \frac{\sum x}{n}$$

Information :

$\bar{X}$  :Score rate-rate

$\sum X$  : Total score of respondents

$n$  :Number of questionnaire items

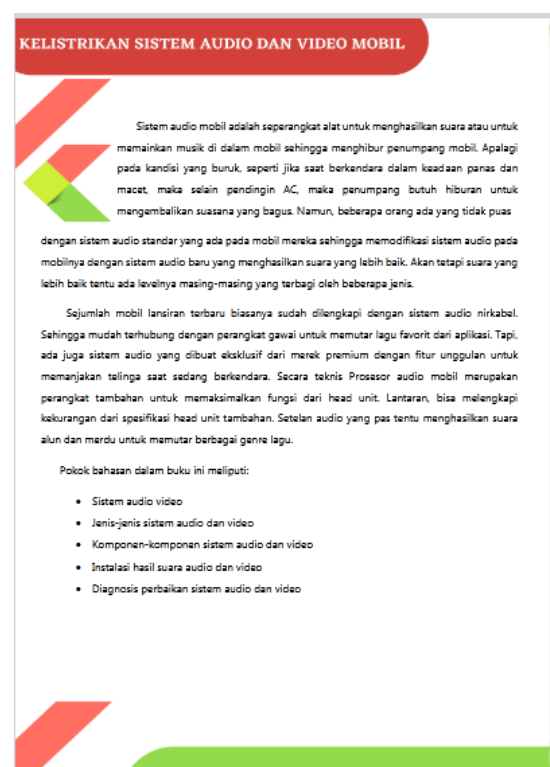
The average percentage obtained then determines the predicate of the audio system electrical module based on the rating scale measurement scale. (Wahyudi et al., 2019, p. 64).

$$\text{Eligibility Percentage (\%)} = \frac{\text{Skor yang diperoleh}}{\text{Skor maksimum}} \times 100\%$$

## Results and Discussion

The final product of this development is an audio and video system learning module. This module covers competency standards for light vehicle electrical maintenance. This module is also equipped with assignments, evaluation at the end of learning and a final assessment to determine the level of student understanding.

This module was prepared based on initial analysis data, the design was made based on students' needs, and the material was divided into modules based on basic competencies and basic competencies according to the curriculum for light vehicle electrical maintenance subjects. In addition, the module is prototyped at the design stage until the module prototype is ready to be validated. This planning stage begins with determining the topic or topics and then arranging the material sequentially according to the learning objectives. Material descriptions are arranged from simple to complex and equipped with supporting images to explain the material created. The final stage of creating a module is adding a foreword, table of contents and making the module design as attractive as possible to increase students' reading motivation. After the module preparation stage, the next stage is module development, which requires expert validation to get suggestions and input on the module to be assembled. The validation results in the form of input and suggestions from various experts (material experts, media experts, subject teachers and student responses) are used as a reference for perfecting the modules that have been assembled, so that the audio and video system learning modules can be considered useful as a reference source in the teaching and learning process. for teachers and students of SMK Muhammadiyah 3 North Klaten.



**Figure 1.** Front and back covers

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|                                          |     |
|------------------------------------------|-----|
| DAFTAR ISI                               |     |
| KATA PENGANTAR.....                      | i   |
| DAFTAR ISI.....                          | iii |
| DAFTAR GAMBAR .....                      | vi  |
| DAFTAR TABEL.....                        | vii |
| BAB I PENDAHULUAN.....                   | 1   |
| A. Deskripsi.....                        | 1   |
| B. Prasyarat.....                        | 1   |
| C. Petunjuk Proses Pembelajaran .....    | 1   |
| 1. Petunjuk Bagi Guru.....               | 1   |
| 2. Petunjuk Bagi Siswa .....             | 2   |
| D. Tujuan Akhir.....                     | 2   |
| E. Kompetensi .....                      | 2   |
| BAB II PEMBELAJARAN I SISTEM AUDIO ..... | 4   |

yang dihasilkan terutama untuk suara bass yang kuat. Kabel untuk jalur sinyal audio harus menggunakan kabel untuk sinyal audio, demikian pula untuk kabel jalur sinyal video harus menggunakan kabel untuk sinyal video, biasanya kabel ini menggunakan steker RCA. Kabel speaker hendaknya juga menggunakan kabel speaker yang berkualitas baik agar suara yang dihasilkan sesuai dengan yang diinginkan.

f) Penataan kabel harus juga mendapatkan perhatian yang serius, penataan kabel yang kurang baik akan merusak kualitas suara yang dihasilkan. Oleh karena itu dalam pemasangan kabel harusnya terpisah antara kabel untuk power supply dan kabel jalur audio, hal ini bertujuan untuk menghindari interferensi yang terjadi dari kabel power supply ke kabel jalur audio yang berakibat merusak kualitas suara yang dihasilkan

g) Penambahan asesoris hendaknya juga disesuaikan dengan kondisi yang ingin ditampilkan, jangan sampai mengganggu kualitas suara.

h) Setelah semua terpasang dengan baik, barulah dilakukan penyetelan. Untuk mendapatkan kualitas suara yang bagus harus dilakukan penyetelan sehingga suara audio terdengar jelas dimasing-masing frekuensi suara.

c. **Fitur-Fitur Tambahan**

1) *Monitor Touchscreen*

Aplikasi monitor layar sentuh mengubah banyak hal di audio mobil.

**Figure 2.** Table of Contents

**Figure 3.** Material Contents

This is reinforced by the results of assessments by material experts, media experts, subject teachers and students in the table below.

**Table 2.** Assessment by Material Experts

| Skor total | Jumlah skor ideal | Persentase |
|------------|-------------------|------------|
| 88         | 96                | 91,00 %    |

Lecturer in the Mechanical Engineering Vocational Education Study Program, Department of Vocational Engineering Education, Faculty of Teacher Training and Education, Bacheloriyuta Tamansiswa University. The results of the module feasibility assessment from material experts with a feasibility percentage of 91.66% were in the very feasible category

**Table 3.** Assessment by Media Members

| Shoes total | Total ideal score | Percentage |
|-------------|-------------------|------------|
| 88          | 100               | 88,00%     |

Lecturer in the Mechanical Engineering Vocational Education Study Program, Department of Vocational Engineering Education, Faculty of Teacher Training and Education, Bachelorwiyata Tamansiswa University. Results of the module feasibility level assessment from media experts with a feasibility percentage of 88.00% in the feasible category. One of the results of the results obtained by teachers majoring in Light Vehicle Engineering at SMK Muhammadiyah 3 North Klaten is audio and video systems. The results of the module feasibility level assessment from subject teachers with a feasibility percentage of 95.37% were in the very feasible category.

**Table 4.** Assessment by Mapel Teachers

| Shoes total | Total ideal score | Percentage |
|-------------|-------------------|------------|
| 103         | 108               | 95,37 %    |

The 10 students of SMK Muhammadiyah 3 North Klaten received the results of the module feasibility level assessment from the small-scale student assessment with an eligibility percentage of 74.60% in the appropriate category.

**Table 5.** Small Scale Student Assessment

| Shoes total | Total ideal score | Percentage |
|-------------|-------------------|------------|
| 567         | 760               | 74,60 %    |

The 33 students of SMK Muhammadiyah 3 North Klaten, totaling 33 students, received the results of the module feasibility level assessment from the large-scale student assessment with an eligibility percentage of 78.26% in the appropriate category.

**Table 6.** Large-Scale Student Assessment

| Shoes total | Total ideal score | Percentage |
|-------------|-------------------|------------|
| 1.963       | 2.508             | 78,26 %    |

Based on the data above, it can be concluded that the audio and video system modules are in the "Very Appropriate" category for use.

The research results show that this research produces a module with the feasibility of the audio and video system material expert system module which will produce a level of up to 91.66% in the very feasible category. The results of the assessment of the feasibility level of the module by the media were 87.00% in the very feasible category. The results of the teacher's assessment obtained a percentage of 95.37% in the very appropriate category. The results of assessing the feasibility level of the module by small-scale students were 74.60% in the feasible category, while large-scale students got a percentage of 78.26%. The results of this research indicate that the development of an Audio Video System Learning Module for the Class XI Light Vehicle Electrical Maintenance Subject at SMK Muhammadiyah 3 North Klaten can help students in the learning process so that they can achieve the desired academic goals. The research results

show that the Audio Video System Module can be used to support the teaching process at SMK Muhammadiyah 3 North Klaten and is capable of doing this.

The results presented here support the work of Rabiman, and Johan (Widiyantoro et al., 2021) who examined the Coomon Rail technology education module and found that the module was easy for students to use and could also increase students' learning motivation. "Development of a Technical Drawing Learning Module for Vocational High School Students" by Kuntoro, Rabiman, Johan (Rabiman et al., 2020a) (Rabiman et al., 2020b). The aim of this research is to create a technical drawing learning module and analyze the feasibility of the module. The research results show that the technical drawing module was developed through several stages.

Assessment of learning media by lecturer media experts shows aspects of media quality, aspects of language use, aspects of media layout. The assessment on the media quality aspect got a percentage of 92.85%, the media expert's assessment on the aspect of language use got a percentage score of 83.33%, the media expert's assessment on the media layout aspect got a percentage score of 75.00%, So the conclusion of the media quality aspect in the module was declared "Decent" and can be used for students in audio and video system modules but further research must be improved. Based on the media expert's assessment above, according to several aspects, the overall score was 88.00% so that in the media expert's assessment it was declared "Very Appropriate" and can be used by students during learning, whereas according to (Idris Harta. 2014) (S et al., 2021) the media expert's assessment in other research received a score The results of the module assessment by media experts have a total percentage score of 85.50% with the category very suitable and can be used by students. So by comparing the two assessments from media experts, other researchers need to improve the media in the module not very far so that the research can be said to be very feasible.

On the assessment of material experts on aspectsself contained The overall percentage score was 83.33%. Next, the material expert assessment regarding aspectssstand alone overall total score percentage of 93.75%, Evaluation of material experts on aspectssadaptive overall total get a percentage score of 100%, Evaluation of material experts on aspectssuser friendly The overall total gets a percentage score of 100%. Based on the material expert's assessment above, according to several aspects, the overall score was 91.66% so that in the material expert's assessment it was declared "Very Appropriate" for audio and video system modules, whereas in other research according to (Ridha & Jasril, 2021) (Sigit Purnomo, Slamet Priyanto, Eko Adi, 2022) the material expert's assessment in other research received a score the results of the module assessment by material experts from a total percentage score of 81.60% with a very feasible category, so the comparison in the 2 assessments from media experts is not much different so that the research can be said to be very feasible, however the percentage scores are very different so that in the assessment of this material expert other researchers must improve further.

In the teacher's assessment of subjects regarding aspectssself instruction got a percentage score of 95.31%, in the teacher's assessment regarding aspectssself contained overall total got a percentage score of 91.66%. Next, the teacher's assessment regarding aspectssstand alone overall score of 93.75%, evaluation of the apologist teacher on aspectssadaptive overall total get a 100% percentage score, Evaluation of the apologist teacher on the aspectssuser friendly The overall score gets a percentage of 87.50%. Based on the assessment of the subject teachers above, according to several aspects, the overall score was 95.37% so that in the expert assessment the material was declared "Very Appropriate" for audio and video system modules, whereas in other research according to (Telaumbanua et al., 2022) the results of the validation

of learning media by The expert validator's achievement level is 87.00% in the very feasible category, so the comparison in the 2 assessments from media experts is not much different, only the percentages are different so that the research can be said to be very feasible.

In students' responses regarding the total material aspect, they got a percentage score of 74.16%. In students' responses regarding the total media layout aspect, they got a percentage score of 75.35%. Based on the responses of the small-scale students above, according to several aspects, the overall score was 74.60%, so that the responses of the small-scale students were declared "Decent" for the audio and video system modules, whereas in other research according to (Sunarya & Putrama, 2016) (Ridha & Jasril, 2021) based on a recapitulation of the assessments from each -each respondent, shows that the assessment given by the students received a score of 66.7% in the Decent category, so the comparison in the 2 assessments from media experts is not much different, only the percentage is different so that the research can be said to be all worthy. However, in the trial above it was not fully suitable for use with the audio and video system module, so there needs to be improvements to the module so that it can be said to be "Very Suitable" for use by students.

In student responses regarding the total material aspect, they got a percentage score of 78.59%, in student responses regarding the total media layout aspect, they got a percentage score of 77.70%. Based on the responses of the large-scale students above, according to several aspects, the overall score was 78.26%, so that the responses of the large-scale students were declared "Decent" for the audio and video system module, whereas in other research according to (Herawati & Muhtadi, 2018) (Handayani, 2021) large group test results were obtained. The overall average score is 95.00% which is qualitatively included in the very decent category. Based on the comparison of the 2 assessments of large-scale student responses which are very different, it needs to be improved further in this research.

## **Conclusion**

Based on research and module development, learning media for the TKRO class XI vocational school for light vehicle electricity module will be produced in the form of an audio and video system. The following are the steps taken to produce educational media for audio and video systems: (Dissemination) Disseminate. Every student in the subject matter module is expected to be active in learning. The educational media developed also includes a discussion of the final evaluation of the lesson or material.

It can be concluded that the audio and video system material is very feasible based on the validity of the material which obtained a final score of 91.66% out of 100%. For validation, the media expert got a score of 88.00% out of 100% on the audio and video system module, it can be concluded that the audio and video system media module is very feasible, but the response of the audio system teacher got a score of 95.37% out of 100%, it can be recommended as very worthy. Based on the module feasibility assessment carried out by students on a smaller scale, the response of Class From the statistics above, it can be concluded that the audio and video system modules are very suitable for use.

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