

# Essential Curriculum Content for Automotive Body Painting at Vocational High Schools: The Delphi Technique

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## Abstract

The extensive content of the curriculum at vocational high schools (SMK) that students must master results in graduates not fully mastering their knowledge. Therefore, this study needs to be conducted to analyze the content of the SMK curriculum so that it can be curated into essential materials based on criteria of urgency, continuity, relevance, and applicability in the curriculum of the automotive body painting course at SMK. This research employs a modified Delphi technique in two rounds, involving a panel of experts consisting of 21 practitioners in the field of automotive painting. The questionnaire was developed concerning the objectives of the automotive body painting curriculum, comprising 16 contents evaluated using a four-level Likert scale. Data collection was carried out using Google Forms. Data analysis was conducted using descriptive statistics with the aid of Excel and SPSS release 27. The study results indicate that there are eight highly essential contents out of the 17 in the automotive body painting curriculum. These eight contents are 1) Implementation of procedures for preparing materials and equipment for repairs; 2) Implementation of panel preparation procedures; 3) Application of putty method; 4) Application of sanding method; 5) Application of masking methods; 6) Implementation of metal panel painting procedures; 7) Implementation of plastic panel painting procedures; and 8) Evaluation and resolution of painting failures. Therefore, in implementing the curriculum, teachers can focus on the highly essential materials to enable students to learn more optimally.

**Keywords:** essential, content, curriculum, automotive body painting, vocational education

## 1. Introduction

Vocational schools are an essential educational option, and every child has the right to pursue education according to their interests and talents, not limited to general schools only (Abdurrahman et al., 2022). By providing an educational pathway focused on practical skills and technical expertise, vocational schools offer a relevant alternative for students who wish to enter the workforce immediately after completing their education. Recognizing and fulfilling the child's right to choose vocational education means providing them equal opportunities to develop their potential, receive meaningful education, and prepare for a brighter future.

Therefore, vocational education plays a crucial role in preparing the younger generation to meet the increasingly complex and dynamic demands of the labour market (Foster & Boll, 2018; Choi et al., 2019; Budría et al., 2009). Through an approach focused on practical skills and direct Application, vocational education enables students to develop specific technical and professional competencies needed by the industry (Guo & Wang, 2020). Additionally, this education builds a resilient and adaptive work mentality, enhancing soft skills such as communication, teamwork, and problem-solving, which are essential in the workplace. Thus, vocational education produces job-ready workers and drives the economy by providing productive and competent human resources, supporting sustainable industrial growth and innovation (Ahmed, 2016).

Vocational schools can be categorized into three main types: school-based vocational education, apprenticeships, and informal training (Guo & Wang, 2020; Abdurrahman et al., 2022). School-based vocational education offers a structured curriculum to develop technical skills within a formal educational environment. Meanwhile, apprenticeship programs allow students to gain direct work experience in the industry, allowing them to apply theoretical knowledge to real-world practice and build professional networks. Informal training includes more flexible and often

shorter-duration courses or training accessible to those who wish to enhance specific skills or obtain certain certifications outside the formal education system (Suharno et al., 2020). Together, these three types of vocational education ensure that students' diverse needs and learning preferences can be met, supporting them in achieving successful and productive careers.

Although school-based vocational education has great potential for preparing skilled workers, there are concerns about the quality of the graduates produced. Some reports indicate that many vocational school graduates still need to improve in meeting industry demands (Lim et al., 2020; Russel, 2018; Abdurrahman et al. 2022). Consequently, many vocational high school graduates need more support. According to data from the Central Statistics Agency (2023), the open unemployment rate in Indonesia in 2023 reached 5.32%, with vocational high school graduates contributing the most at 8.62%. This indicates that even though vocational school graduates should be ready to work, many of them still struggle to find employment.

On the other hand, job opportunities in Indonesia are pretty substantial, as evidenced by Indonesia's manufacturing GDP., which has a growth rate of 4.64% in 2023 (Central Statistics Agency, 2023). This average growth rate is higher than the global average growth rate of 2.35% and the number of members of The Organization for Economic Cooperation and Development (OECD) 2.08%. It is also higher compared to industrialized countries and peer countries such as South Korea (2.53%), Mexico (2.05%), Germany (1.62%), Japan (1.56%), Italy (1.38%), Thailand (1.02%), Australia (-0.23%), and Brazil (-1.69%) (OECD, 2023).

Factors such as curricula that do not match industry needs, inadequate practical facilities, and lack of collaboration between schools and companies contribute to the low quality of vocational school graduates (Abdurrahman et al., 2022; Firdaus et al., 2022). The curriculum in vocational high schools (S.M.K.) still needs to improve the quality of graduates. One of the main issues is the need for more alignment between the taught material and industry needs. According to a report by the Research and Development Agency of the Ministry of Education and Culture (2020), many vocational programs in SMK. must be aligned with technological developments and current labour market demands. Additionally, limitations in educational facilities and resources, such as inadequate laboratories and practical equipment, exacerbate the situation. The report also notes that the need for more training for vocational school teachers in adopting new technologies and current teaching methods adds to the challenges in producing job-ready graduates (Suharno et al., 2020). This results in SMK. raduates often being less competitive and struggling to compete in the job market

SMK curriculum is often considered too dense with non-essential material, reducing the focus on practical skills needed in the workforce. According to reports from the Ministry of Education and Culture, many vocational students are burdened with theoretical subjects that are not directly related to vocational competencies, resulting in limited time for practice and technical skill development. This is further supported by findings from Balitbang, which show that about 40% of the SMK. curriculum consists of general subjects that are irrelevant to students' specific expertise (Walukow. et.al. 2021). As a result, SMK graduates often need to prepare to face industry challenges due to a lack of in-depth practical skills relevant to their future careers.

Through this study, the authors will analyze the content of the vocational high school curriculum, specifically automotive body painting, to determine essential materials according to industry needs by involving experts and practitioners. Using the Delphi technique, the criteria used in determining essential content are urgency, relevance, continuity, and applicability (Fikri & Hasudungan, 2021).

## 2. Theoretical Background

### 2.1 Curriculum Content

The content of a curriculum is the backbone of an effective educational system. Content reflects the subject matter taught and the values, skills, and understanding intended to be instilled in students (Ornstein & Hunkins, 1998). Well-organized content ensures that education provides a strong foundation for students' intellectual, social, and emotional development. Through diverse and relevant content, students can gain a deep understanding of the world around them and prepare for future challenges. Additionally, content that aligns with the needs and interests of students can enhance their engagement in the learning process, boost motivation, and expedite the achievement of learning objectives. Thus, the importance of content in a curriculum cannot be overstated, as it forms the foundation for creating meaningful and effective educational experiences for students.

When a curriculum's content is excessive and non-essential, it can have detrimental consequences for the learning process. Too much material can cause students to feel overwhelmed and burdened, ultimately hindering their understanding of key concepts (Print, 1993). Moreover, a lack of focus on essential content can lead to wasted time and

resources, as time that should be spent understanding core material is instead divided among less important topics. Consequently, the learning process becomes inefficient and ineffective, potentially reducing student learning motivation.

Overly dense curriculum content can also make it difficult for teachers to design meaningful and relevant student learning experiences. Therefore, curriculum developers must ensure that the content included in the curriculum is essential and relevant and enables meaningful learning experiences for students (Finch & Crunkilton, 1979). Emphasizing the development of a curriculum focused on essential and relevant content is crucial for achieving high-quality education that meets contemporary demands.

In determining curriculum content, developers should apply several criteria: self-sufficiency, significance, validity, interest, utility, learnability, and feasibility (Ornstein & Hunkins, 1998). Meanwhile, Miller and Seller (1985) suggest using criteria such as psychological criteria, social/political criteria, student interest criteria, student readiness criteria, utilitarian/practical criteria, and philosophical criteria. Bardy (1994) and Print (1993) use criteria such as validity, significance, interest, learnability, consistency with social reality, and utility. These criteria should guide the determination of curriculum content; however, if all criteria cannot be met, at least three should be satisfied: significance, validity, and utility (Print, 1993).

The significance criterion refers to the curriculum content's ability to develop attitudes, knowledge, and skills. Validity pertains to the accuracy of the curriculum content. Utility refers to the content selected for the curriculum that benefits students' lives, particularly about skills and employment (Ornstein & Hunkins, 1998; Miller & Seller, 1985; Bardy, 1994; Print, 1993). In vocational education, it is essential to directly involve businesses and the workforce in determining curriculum content to ensure it meets job requirements and benefits students.

### *2.2 Automotive Body Painting*

Automotive body painting is part of the Light Vehicle Body Engineering concentration. This field evolves with the development of societal and automotive industry needs. Throughout 2023, the automotive industry's performance grew by 9.66%, higher than the previous year (BPS, 2023). The Light Vehicle Body Engineering concentration aims to foster professionalism and creativity in students, aligning with the job levels outlined in the Indonesian National Work Competency Standards (SKKNI) as Junior Technicians (Removal & Assembly Body, Cut & Welding Body, Windshield Removal & Assembly Body, Ding & Dent Body, Paintless Dent & Removal Body, Surface Preparation, Sprayer, Polisher, Color Matcher/Tinter, Toolman) in the field of light vehicle body engineering, from design, manufacture, maintenance, to repair of vehicle body panels (B.S.K.P.,2022).

Light vehicle body engineering aims to equip students with hard skills, soft skills, industrial work culture attitudes, Health, Safety, and Environment (K3LH) knowledge, skills, and attitudes at intermediate and advanced levels. Specifically, the learning outcomes of the Light Vehicle Body Engineering concentration are: 1) understanding professions and entrepreneurship (job profiles and technology entrepreneurship) and business opportunities related to the development of automotive body technology and the job market, as well as global issues related to automotive body panel repair; 2) understanding maintenance and repair techniques related to the entire automotive body painting process; 3) understanding the use of equipment and tools according to standards used in the maintenance and repair of body electrical systems, accessories, and interiors; and 4) understanding the entire process of designing, manufacturing, maintaining, and repairing Light Vehicle Body Engineering according to Standard Operating Procedures (SOP), Health, Safety, and Environment.

### *2.3 Delphi Technique*

The Delphi technique is a forecasting method that uses a panel of experts to reach a consensus (Tierney et al., 2024). The Delphi method is very effective for determining curriculum content because it can foresee future developments (Finch & Crunkilton, 1979). In practice, the Delphi method is also highly effective in determining priorities, goals, and emerging job opportunities.

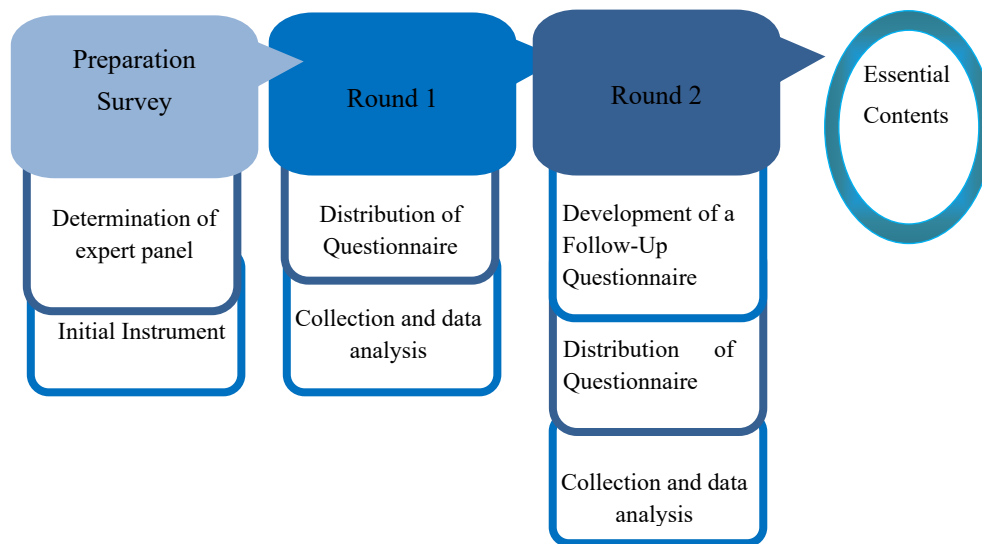
The Delphi technique consists of a series of interrogations using instruments on a sample of individuals. The focus of the technique is to gather expert opinions on specific curriculum content according to the expertise of the sample. Since the samples never meet, the respondents' objectivity is very high in providing input on curriculum content (Finch & Crunkilton, 1979).

### 3. Research Methodology

#### 3.1 Research Design

This research employs a survey method conducted in the Special Region of Yogyakarta, Indonesia, utilizing a modified Delphi technique. The Delphi Technique is utilized in this research due to its ability to achieve consensus from a group of experts through a series of structured questionnaire rounds. In this process, each expert provides responses or opinions, which are then analyzed and summarized before being sent back to the experts for review and revision in subsequent rounds. This method is highly effective in collecting and integrating expert views from various locations, facilitating more informed and objective decision-making. Additionally, the Delphi Technique helps minimize individual biases and promotes honest and open communication among participants, ultimately resulting in more valid and reliable research outcomes.

The following are the stages of research using the Delphi technique:



**Figure 1.** Delphi Procedure

##### 3.1.1 Determination of Expert Panel

The expert panel is selected based on the criterion that experts must work in the automotive industry, either in manufacturing or body repair and painting, with a minimum of 10 years of experience. Experts who meet the criteria are then invited to participate in this study. Based on these criteria, the number of experts willing to participate is 21.

##### 3.1.2 Development of Initial Instrument

The initial questionnaire is developed based on the Decree of the Head of the Standards, Curriculum, and Educational Assessment Agency of the Ministry of Education, Culture, Research, and Technology (B.S.K.A.P. Kemendikbud Ristek) Number 008/H/Kr/2022 concerning Learning Outcomes in Early Childhood Education, Basic Education, and Secondary Education in the Merdeka Curriculum. According to this regulation, there are 16 curriculum content areas for the Automotive Body and Painting subject: 1) Implementation of panel preparation procedures; 2) Application of primer paint; 3) Application of putty method; 4) Application of sanding method; 5) Application of surfacer method; 6) Implementation of procedures for using body sealer; 7) Implementation of minor repair/touch-up procedures; 8) Implementation of partial repair procedures; 9) Implementation of procedures for preparing materials and equipment for repairs; 10) Application of masking methods; 11) Application of the color mixing method; 12) Evaluation of color adjustments/color matching; 13) Implementation of metal panel painting procedures; 14) Implementation of plastic panel painting procedures; 15) Evaluation and resolution of painting failures; 16) Application of polishing and coating methods.

Responses are organized using a four-point Likert scale: strongly agree, agree, disagree, and strongly disagree.

Round 1:

• Distribution of Questionnaire

The readability-tested questionnaire is then distributed to the 21 expert panel members. The completion time is limited to 7 days.

• Collection and Initial Data Analysis

The collected data are tabulated and analyzed using S.P.S.S. software.

Round 2:

• Development of a Follow-Up Questionnaire

The data analysis results form the basis for developing the following instrument. The follow-up questionnaire is divided into four groups to measure urgency, relevance, and applicability. The responses use a four-point Likert scale: very high, high, low, and very low.

• Distribution of Questionnaire

The revised questionnaire, incorporating feedback from the first round, is distributed to the 21 expert panel members. The completion time is limited to 7 days.

• Collection and Analysis of Round 2 Data

The collected data from the second round are tabulated and analyzed using S.P.S.S. software to identify essential content in the body and painting curriculum.

• Conclusion and Reporting

The first-round data analysis results form the basis for drawing conclusions and reporting.

3.2 Data Analysis Techniques

The data collected in this study will be organized into tables using Excel software. Next, the data will be entered into S.P.S.S. version 27 for analysis using descriptive statistics to obtain an overall picture of the essential content of the body painting curriculum through mode, mean, maximum, and minimum scores. The descriptive statistical test results will be used to determine the category of each content with the following criteria (Sugiono, 2017):

**Table 1.** Interpretation Criteria

No.	Criteria	Range	Interpretation
1.	$Mi + 1,5SDi - Mi + 3,0SDi$	3,26 – 4,00	Very High
2.	$Mi - Mi + 1,5SDi$	2,51 – 3,25	High
3.	$Mi - 1,5SDi - Mi$	1,76 – 2,50	Low
4.	$Mi - 3,0SDi - Mi - 1,5SDi$	1,00 – 1,75	Very Low

**4. Result**

4.1 Round 1

The content of the automotive body painting curriculum is developed by referring to the curriculum objectives. The following is the content agreed upon by a panel of experts after rounds using the Delphi Technique.

The table shows that the panel of experts strongly agrees with the proposed curriculum content. In this first cycle, the panel of experts provided input on adding the content "Implementation of Drying Procedures." Based on this input, the curriculum content increased to seventeen items in the second round.

**Table 2.** Contents Automotive Body Painting Curriculum

No	Contents	X <sub>min</sub>	X <sub>max</sub>	Mean	Category
1.	Implementation of panel preparation procedures	4.00	4.00	4.00	strongly agree
2.	Application of primer paint	3.00	4.00	3.10	strongly agree
3.	Application of putty method,	3.00	4.00	3.43	strongly agree
4.	Application of sanding method	3.00	4.00	3.43	strongly agree
5.	Application of surfacer method	3.00	4.00	3.14	strongly agree
6.	Implementation of procedures for using body sealer	3.00	4.00	2.76	strongly agree
7.	Implementation of minor repair/touch-up procedures	3.00	4.00	3.29	strongly agree
8.	Implementation of partial repair procedures;	3.00	4.00	3.19	strongly agree
9.	Implementation of procedures for preparing materials and equipment for repairs;	3.00	4.00	3.14	strongly agree
10.	Application of masking methods;	3.00	4.00	3.43	strongly agree
11.	Application of the color mixing method,	3.00	4.00	3.05	strongly agree
12.	Evaluate color adjustments/color matching,	3.00	4.00	3.14	strongly agree
13.	Implementation of metal panel painting procedures	3.00	4.00	3.62	strongly agree
14.	Implementation of plastic panel painting procedures;	3.00	4.00	3.48	strongly agree
15.	Evaluate and resolve painting failures;	3.00	4.00	3.43	strongly agree
16.	Application of polishing and coating methods	3.00	4.00	3.38	strongly agree

#### 4.2 Round 2

The subject of car body painting consists of seventeen contents, from the Implementation of panel preparation procedures to the Application of polishing and coating methods. Here are the findings of the essential content reviewed in terms of urgency compared to the other materials:

**Table 3.** The Urgency Level of the Content in the Car Body Painting

No	Contents	X <sub>min</sub>	X <sub>max</sub>	Mean	Category
1.	Implementation of panel preparation procedures	3.00	4.00	3.71	Very high
2.	Application of primer paint	3.00	4.00	3.10	High
3.	Application of putty method,	3.00	4.00	3.43	Very high
4.	Application of sanding method	3.00	4.00	3.43	Very high
5.	Application of surfacer method	3.00	4.00	3.14	High
6.	Implementation of procedures for using body sealer	2.00	3.00	2.76	High
7.	Implementation of minor repair/touch-up procedures	3.00	4.00	3.29	Very high
8.	Implementation of partial repair procedures;	3.00	4.00	3.19	High
9.	Implementation of procedures for preparing materials and equipment for repairs;	3.00	4.00	3.14	High
10.	Application of masking methods;	3.00	4.00	3.43	Very high
11.	Application of the color mixing method,	3.00	4.00	3.05	High
12.	Evaluate color adjustments/color matching,	3.00	4.00	3.14	High
13.	Implementation of metal panel painting procedures	3.00	4.00	3.62	Very high
14.	Implementation of plastic panel painting procedures;	3.00	4.00	3.48	Very high
15.	Implementation of Drying Procedures	2.00	3.00	2.95	High
16.	Evaluate and resolve painting failures;	3.00	4.00	3.43	Very high
17.	Application of polishing and coating methods	3.00	4.00	3.38	Very high

Table 3. shows that based on the criteria of urgency or the importance level of the materials in the car body painting subject, nine materials are categorized as very important and eight as critical. Based on the average in the very urgent

group, items can be sorted from the highest to the lowest as follows: 1) Implementation of panel preparation procedures; 2) Implementation of metal panel painting procedures; 3) Implementation of plastic panel painting procedures; 4) Application of putty method; Application of sanding method; Application of masking methods; Evaluate and resolve painting failures; 5) Application of polishing and coating methods; 6) Implementation of minor repair/touch up procedures. In the urgent category, items can be sorted from the highest to the lowest score: 1) Implementation of partial repair procedures; 2) Application of surfacer method; Implementation of procedures for preparing materials and equipment for repairs; Evaluate color adjustments/color matching; 3) Application of primer paint; 4) Application of the color mixing method; 5) Implementation of Drying Procedures; 6) Implementation of procedures for using body sealer.

The second criterion in determining essential content is continuity. Continuity criteria indicate that the material is the basis for other materials or materials that will be studied further. Table 4 shows three contents with very high continuity and 14 contents categorized as high continuity.

**Table 4.** The Continuity Level of the Content in the Car Body Painting

No	Contents	$X_{min}$	$X_{max}$	Mean	Category
1.	Implementation of panel preparation procedures	3.00	4.00	3.14	High
2.	Application of primer paint	3.00	4.00	3.48	Very high
3.	Application of putty method,	3.00	4.00	3.05	High
4.	Application of sanding method	3.00	4.00	3.57	Very high
5.	Application of surfacer method	3.00	4.00	2.95	High
6.	Implementation of procedures for using body sealer	2.00	3.00	2.81	High
7.	Implementation of minor repair/touch-up procedures	3.00	4.00	3.05	High
8.	Implementation of partial repair procedures;	3.00	4.00	2.86	High
9.	Implementation of procedures for preparing materials and equipment for repairs;	3.00	4.00	3.14	High
10.	Application of masking methods;	3.00	4.00	3.14	High
11.	Application of the color mixing method,	3.00	4.00	2.90	High
12.	Evaluate color adjustments/color matching,	3.00	4.00	2.81	High
13.	Implementation of metal panel painting procedures	3.00	4.00	3.19	High
14.	Implementation of plastic panel painting procedures;	3.00	4.00	3.14	High
15.	Implementation of Drying Procedures	2.00	3.00	2.95	High
16.	Evaluate and resolve painting failures;	3.00	4.00	3.38	Very high
17.	Application of polishing and coating methods	3.00	4.00	2.62	High

Based on the mean score in the very high continuity, items can be sorted from the highest to the lowest: 1) Application of primer paint; 2) Application of sanding method; and 3) Evaluate and resolve painting failures. In the high continuity category, items can be sorted from the highest to the lowest score: 1) Implementation of metal panel painting procedures; 2) Implementation of panel preparation procedures; Implementation of procedures for preparing materials and equipment for repairs; Application of masking methods; Implementation of plastic panel painting procedures; 3) Application of putty method; Implementation of minor repair/touch up procedures; 4) Application of surfacer method; Implementation of Drying Procedures; 5) Application of the color mixing method; 6) Implementation of partial repair procedures; 7) Implementation of procedures for using body sealer; Evaluate color adjustments/color matching; 8) Application of polishing and coating methods.

The third criterion in determining essential content is relevance. Relevance refers to the connection of material in the body and automotive painting subject with other subjects. The descriptive analysis results of 17 contents in the body and automotive painting subject are presented in Table 5 below:

**Table 5.** The Relevance Level of the Content in the Car Body Painting

No	Contents	X <sub>min</sub>	X <sub>max</sub>	Mean	Category
1.	Implementation of panel preparation procedures	3.00	4.00	3.38	Very high
2.	Application of primer paint	3.00	3.00	3.00	High
3.	Application of putty method,	3.00	4.00	3.48	Very high
4.	Application of sanding method	3.00	4.00	3.71	Very high
5.	Application of surfacer method	3.00	4.00	3.57	Very high
6.	Implementation of procedures for using body sealer	2.00	3.00	2.52	High
7.	Implementation of minor repair/touch-up procedures	3.00	4.00	3.14	High
8.	Implementation of partial repair procedures;	3.00	4.00	3.57	Very high
9.	Implementation of procedures for preparing materials and equipment for repairs;	3.00	4.00	3.24	Very high
10.	Application of masking methods;	3.00	4.00	3.43	Very high
11.	Application of the color mixing method,	3.00	4.00	3.05	High
12.	Evaluate color adjustments/color matching,	3.00	4.00	3.14	High
13.	Implementation of metal panel painting procedures	3.00	4.00	3.90	Very high
14.	Implementation of plastic panel painting procedures;	3.00	4.00	3.33	Very high
15.	Implementation of Drying Procedures	3.00	4.00	3.10	High
16.	Evaluate and resolve painting failures;	3.00	4.00	3.52	Very high
17.	Application of polishing and coating methods	3.00	4.00	3.29	Very high

Table 5. shows that based on the criteria of relevance level of the contents in the car body painting subject, six contents are categorized as very high and eight materials are categorized as high. Based on the mean score in the very high category, items can be sorted from the highest to the lowest as follows: 1) Application of sanding method; 2) Application of putty method; Implementation of procedures for preparing materials and equipment for repairs; 3) Implementation of metal panel painting procedures; 4) Implementation of plastic panel painting procedures; Evaluate and resolve painting failures. In the high relevance category, items can be sorted from the highest to the lowest score: 1) Application of masking methods; 2) Application of primer paint; 3) Implementation of minor repair/touch-up procedures; 4) Implementation of panel preparation procedures; 5) Application of surfacer method; Implementation of drying procedures; 6) Application of the color mixing method; 7) Implementation of partial repair procedures; 8) Evaluate color adjustments/color matching; 9) Implementation of procedures for using body sealer; Application of polishing and coating methods.

The fourth criterion in determining essential content is applicability. Applicability refers to the level of usefulness of the material in the body and automotive painting subject in the workplace. The descriptive analysis results of 17 contents in the body and automotive painting subject are presented in Table 6 below.

Table 6. shows that based on the criteria of applicability level of the contents in the car body painting subject, 11 contents are categorized as very high and seven materials are categorized as high. Based on the mean score in the very high category, items can be sorted from the highest to the lowest as follows: Implementation of metal panel painting procedures; 2) Application of sanding method; 3) Application of surfacer method; Implementation of partial repair procedures; 4) Evaluate and resolve painting failures; 5) Application of putty method; 6) Application of masking methods; 7) Implementation of panel preparation procedures; 8) Implementation of plastic panel painting procedures; 9) Application of polishing and coating methods; 10) Implementation of procedures for preparing materials and equipment for repairs. In the high applicability category, items can be sorted from the highest to the lowest score: Implementation of minor repair/touch-up procedures; Evaluate color adjustments/color matching; 2) Implementation of Drying Procedures; 3) Application of the color mixing method; 4) Application of primer paint; 5) Implementation of procedures for using body sealer.



**Table 6.** The Applicability Level of the Content in the Car Painting

No	Contents	$X_{min}$	$X_{max}$	Mean	Category
1.	Implementation of panel preparation procedures	3.00	3.00	3.00	High
2.	Application of primer paint	3.00	4.00	3.11	high
3.	Application of putty method,	3.00	4.00	3.48	Very high
4.	Application of sanding method	3.00	4.00	3.71	Very high
5.	Application of surfacer method	2.00	4.00	2.95	High
6.	Implementation of procedures for using body sealer	2.00	3.00	2.67	High
7.	Implementation of minor repair/touch-up procedures	3.00	4.00	3.05	High
8.	Implementation of partial repair procedures;	2.00	3.00	2.86	High
9.	Implementation of procedures for preparing materials and equipment for repairs;	3.00	4.00	3.48	Very high
10.	Application of masking methods;	3.00	4.00	3.14	High
11.	Application of the color mixing method,	2.00	4.00	2.90	High
12.	Evaluate color adjustments/color matching,	2.00	3.00	2.81	High
13.	Implementation of metal panel painting procedures	3.00	4.00	3.29	Very high
14.	Implementation of plastic panel painting procedures;	3.00	4.00	3.24	Very high
15.	Implementation of Drying Procedures	2.00	3.00	2.95	High
16.	Evaluate and resolve painting failures;	3.00	4.00	3.24	Very high
17.	Application of polishing and coating methods	2.00	3.00	2.67	High

Subsequently, based on the data description provided in the aspects of urgency, continuity, relevance, and applicability, the essential content for the body and automotive painting subject can be identified as follows:

**Table 7.** The Essential Level of the Content in the Car Painting

No	Contents	$X_{min}$	$X_{max}$	Mean	Category
1.	Implementation of panel preparation procedures	3.00	3.71	3.30	Very high
2.	Application of primer paint	3.00	3.48	3.16	High
3.	Application of putty method,	3.05	3.48	3.35	Very high
4.	Application of sanding method	3.43	3.71	3.60	Very high
5.	Application of surfacer method	2.95	3.57	3.15	High
6.	Implementation of procedures for using body sealer	2.52	2.81	2.68	High
7.	Implementation of minor repair/touch-up procedures	3.05	3.29	3.13	High
8.	Implementation of partial repair procedures;	2.86	3.57	3.11	High
9.	Implementation of procedures for preparing materials and equipment for repairs;	3.14	3.48	3.26	Very high
10.	Application of masking methods;	3.14	3.43	3.28	Very high
11.	Application of the color mixing method,	2.90	3.05	2.97	High
12.	Evaluate color adjustments/color matching,	2.81	3.14	2.97	High
13.	Implementation of metal panel painting procedures	3.19	3.90	3.49	Very high
14.	Implementation of plastic panel painting procedures;	3.14	3.48	3.29	Very high
15.	Implementation of Drying Procedures	2.95	3.10	2.99	High
16.	Evaluate and resolve painting failures;	3.24	3.52	3.39	Very high
17.	Application of polishing and coating methods	2.62	3.38	2.99	High

Table 7 shows eight essential and nine essential contents in the vocational high school body and painting curriculum. Based on the mean score in the very high category, items can be sorted from the highest to the lowest as follows: 1)

Application of sanding method; 2) Implementation of metal panel painting procedures; 3) Evaluate and resolve painting failures; 4) Application of putty method; 5) Implementation of panel preparation procedures; 6) Implementation of plastic panel painting procedures; 7) Application of masking methods; 8) Implementation of procedures for preparing materials and equipment for repairs. In the high essential category, items can be sorted from the highest to the lowest score: 1) Application of primer paint; 2) Application of surfacer method; 3) Implementation of minor repair/touch-up procedures; 4) Implementation of partial repair procedures; 5) Implementation of Drying Procedures; Application of polishing and coating methods; 6) Application of the color mixing method; Evaluate color adjustments/color matching; 7) Implementation of minor repair/touch up procedures.

## 5. Discussion

Determining the content in curriculum planning is a crucial stage. This is because curriculum content selection must consider several criteria, namely the needs of students, national educational goals, the development of science and technology, as well as social and cultural dynamics (Brady, 1994; Miller & Seller, 1985). Each criterion needs to be carefully considered so that the curriculum can comprehensively meet educational needs, stay relevant to the times, and equip students with the necessary skills to face future challenges (Oliva & Gordon, 2013). Thus, determining curriculum content is not just about selecting teaching materials but also designing meaningful and impactful learning experiences for student development.

The content of vocational education curricula also needs to consider existing job opportunities (Finch & Crunkilton, 1979). This is important so that graduates possess skills and competencies relevant to market needs, making it easier to find employment and contribute effectively. Moreover, by aligning the curriculum with the demands of the business and industry sectors, vocational education institutions can bridge the gap between theory and practice, ensuring that the material taught in class aligns with the realities students will face in the field. Partnerships with companies and industries in determining curriculum content are essential to ensure that vocational education remains dynamic and responsive to changing job market needs (Abdurrahman et al., 2022).

Research findings indicate that there are 17 contents agreed upon by practitioners to be included in the automotive body painting curriculum. One of the contents is a suggestion from practitioners, namely implementing Drying Procedures. In the painting process, drying is the final stage aimed at improving the quality of the paint job by providing gloss and adhesion, preventing it from easily peeling off (Sopiyan, et.al, 2022; Siregar & Abidin, 2020; Supriyono, 2019). Industry input will enhance curriculum content's validity, reliability, and utility (Print, 1993). Therefore, this content is deemed worthy of being added to the automotive body painting curriculum.

Research also shows eight essential contents out of the 17 in the automotive body painting curriculum. These eight contents are 1) Implementation of procedures for preparing materials and equipment for repairs; 2) Implementation of panel preparation procedures; 3) Application of putty method; 4) Application of sanding method; 5) Application of masking methods; 6) Implementation of metal panel painting procedures; 7) Implementation of plastic panel painting procedures; and 8) Evaluate and resolve painting failures. This indicates that nine contents have been reduced in the automotive body painting curriculum. However, when analyzed, these eight contents effectively represent the tasks in the painting process (Argana, 2013).

Reducing material in the curriculum will positively impact if it does not interfere with achieving the curriculum's set objectives (Print, 1993). For students, the reduction in material to be studied will enhance their in-depth and comprehensive understanding of the topics. More free time allows students to explore the material in greater detail, engage in deep discussions, and work on more challenging and practical projects or assignments. A lighter study load can also reduce stress and fatigue, enabling students to learn better and enjoy the educational process. The material reduction also allows students to develop critical, analytical, and creative thinking skills, as they are memorizing information and truly understanding and applying it in various situations. Ultimately, this approach will produce more prepared and confident students facing academic and future life challenges.

Reducing material in the curriculum will positively impact teachers' performance. Teachers can focus on more in-depth and practical teaching with less material to deliver. Teachers have more time to plan and develop innovative and interactive teaching methods, which can enhance student engagement and understanding. Furthermore, teachers can give more attention to each student, helping them better understand the material and support individual development. Reducing material also allows teachers to conduct more frequent evaluations and provide essential feedback in the teaching and learning process. Consequently, the quality of teaching improves, and teachers can work more optimally and efficiently, ultimately positively impacting student learning outcomes.

This aligns with Bruner's opinion in Rusman (2017), who strongly views the importance of understanding basic or core concepts in learning. Bruner further states that essential material, often called the "core curriculum," is critical to building a solid understanding. Bruner believes that education should focus on the understanding and development of essential concepts, not just memorizing irrelevant facts or information. Bruner also proposed the concept of the "spiral curriculum," which emphasizes learning based on core concepts taught repeatedly with different levels of complexity in each cycle. This approach aims to ensure deep understanding and build a solid foundation in learning.

Dewey expressed a similar opinion to Gordon and English (2016), who stated the importance of student-centred learning and the relevance of subject matter to students' real-life experiences. Dewey believes that understanding basic concepts in the context of real-world situations is vital in developing critical thinking and students' ability to solve problems. Likewise, Vygotsky (1986) emphasized the importance of the "zone of proximal development," where students' understanding can be enhanced through appropriate guidance or teaching. Understanding basic concepts becomes the foundation for developing advanced thinking and cognitive skills in this context.

Research findings also indicate that essential content is primarily determined by its industrial applicability. This is reasonable because materials most utilized in the industry indirectly prepare students for the workforce. Additionally, skills with high applicability are generally more relevant in daily life. Learning such skills can provide concrete benefits in various aspects of life, such as employment, social relationships, and everyday problem-solving. Applicable skills can be used to significantly contribute to society or social environments, involving helping others, participating in community projects, or providing solutions to existing problems.

Research findings on urgent aspects indicate that the most urgent content is implementing metal panel painting procedures. This stage is the final step in painting that provides surface protection and enhances the aesthetic appearance of the vehicle's design/performance (Argana, 2013). Therefore, final painting becomes the most critical stage and must be handled carefully to achieve optimal results and coat the surface as desired when done under suitable atmospheric conditions (He, 2024; Tjolleng, 2023).

The final paint quality of vehicles is crucial in the automotive industry. It significantly influences consumer purchasing decisions because the vehicle's exterior appearance is the first aspect observed and evaluated. A vehicle with smooth, glossy, and durable paint leaves a positive impression, demonstrating attention to detail and high production quality. Therefore, automotive manufacturers must ensure that every stage of the painting process is meticulously executed using the best materials and techniques to achieve optimal results (Zhou et al., 2020; Cavalcante et al., 2020; He, 2024).

Continuity criteria are the second aspect in the analysis of automotive body painting curriculum content. Findings indicate that the Application of the sanding method is content with very high continuity based on the continuity criteria. This is because the Sanding Method will be revisited in each stage of the painting process. Several painting stages that will apply the Sanding Method towards the end of their processes include Implementation of panel preparation procedures, Application of primer paint, Application of putty method, Application of surfacer method, Implementation of metal panel painting procedures, and Implementation of plastic panel painting procedures (Argana, 2013).

Sanding in the painting process has varying characteristics, especially regarding applied pressure, sandpaper roughness, and tools used. This is due to the specificity of each painting stage in its process. However, the Application of the Sanding Method plays a crucial role in painting by preparing the vehicle's surface for proper paint adhesion, eliminating imperfections, and ensuring a smooth and uniform final finish. The Application of the Sanding Method is also highly relevant as it connects with other content. Therefore, a deep understanding of sanding methods is crucial for students to master automotive body painting skills. Up to now, the sanding work in the automotive body painting process cannot be replaced by machines; it can only be assisted using tools (Molina et al., 2017). Therefore, the Application of sanding has become an essential part of the curriculum that needs to be taught.

## 6. Conclusion

This study involved practitioners in the vehicle painting field, working in both industrial and business sectors. The practitioners agreed that the essential content in the vocational high school automotive body painting curriculum includes: 1) Implementation of procedures for preparing materials and equipment for repairs; 2) Implementation of panel preparation procedures; 3) Application of putty method; 4) Application of sanding method; 5) Application of masking methods; 6) Implementation of metal panel painting procedures; 7) Implementation of plastic panel painting procedures; and 8) Evaluate and resolve painting failures. These findings will benefit students. Firstly, this material provides a solid foundation for understanding critical concepts necessary within specific fields of study. This helps students build a robust framework for comprehending more complex topics in the future. Secondly, essential material

also prepares students to face challenges in the real world regarding knowledge and practical skills. Studying this material allows students to develop relevant skills necessary for success in their workplace or personal lives. Thirdly, essential material often directly relates to industry needs or the job market, enabling students to be more professionally prepared upon completing their education.

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### Data sharing statement

No additional data are available.

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