



ASEAN Journal of Science and Engineering Education



Journal homepage: <http://ejournal.upi.edu/index.php/AJSEE/>

Curriculum Development in Science Education in Vocational School

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ABSTRACTS

The purpose of this study was to determine the science education curriculum in vocational high schools. We used the literature review method to obtain data. We analyzed the national curriculum in Indonesia regarding science education in vocational schools. The results showed that almost all vocational programs in vocational schools contain material about science education. The science education curriculum was contained in class X material in the content of vocational specialization (C1, C2, and C3), especially integrated science subjects. That is because science material was the basis for studying further material related to scientific phenomena in an applicative way. This research is expected to make it easier for readers to understand science education in vocational schools.

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ARTICLE INFO

Article History:

Submitted/Received 22 Jun 2021

First revised 20 Jul 2021

Accepted 29 Aug 2021

First available online 30 Aug 2021

Publication date 01 Dec 2021

Keyword:

Curriculum,

Education,

Science Education,

Teaching,

Vocational Schools.

1. INTRODUCTION

Vocational education is a different learning type from college or universities, offering skills and knowledge required to get jobs in the industry. Vocational school is coordinated with the needs of the labor market and is an integral part of the education system. While college and university education often provides broad knowledge and theory that could be applied to a variety of professions within a certain field in the industry. That is why there is a need for understanding the curriculum in vocational education (Ana, 2020; Handayani *et al.*, 2020).

Several reports published information regarding the curriculum (Widiaty *et al.*, 2020; Rosina *et al.*, 2021; Maryanti *et al.*, 2021; Al-Obaidi, 2021). However, no reports are explaining in detail core competencies and basic competencies.

The purpose of this study was to determine the science education curriculum in vocational schools. The literature review method was used to obtain data. The national curriculum on science education in vocational secondary schools was analyzed by us. We obtained the results of research that almost all vocational skills programs contain material on science education.

2. METHODS

We conducted a literature study by searching for several references regarding science education, curriculum, and vocational school. Detailed information for searching literature is explained in our previous studies (Azizah *et al.*, 2021; Al Husaeni *et al.*, 2022).

3. RESULTS AND DISCUSSION

Vocational school is one of the schools that is equivalent to the high school level. **Figure 1** shows the correlation between vocational school, curriculum, and industry. The curriculum is important especially for vocational school since vocational school has a direct correlation to the industry. Graduate students must have abilities that fit with the industries' requirements.

In Indonesia, there are 146 areas of expertise in vocational schools. Data was obtained from <http://smk.kemdikbud.go.id/konten/4097/kompetensi-inti-dan-kompetensi-dasar-mata-pelajar-smk-perdirjen-dikdasmen-no-464dd5kr2018>, retrieved on March 2021.

The national curriculum in vocational schools consists of core competencies and basic competencies. Core competencies (KI) include four domains that must be mastered by students, namely spiritual (KI-1), social (KI-2), knowledge (KI-3), and skills (KI-4) (See **Figure 2**). Basic competencies are the elaboration of core competencies. The curriculum contains several groups of subjects. The content of the subject groups consists of subjects:

- (i) National content, known as A-class content. Detailed information is in the following link: https://drive.google.com/file/d/1TaqC4uZ6p_gJS87RDle1rdJQIfYc8RzG/view, retrieved on March 2021
- (ii) Regional content, known as B-class content. Detailed information is in the following link: https://drive.google.com/file/d/1XG1s_YCyBTOHGP45iAao3r2AhQim1S8_/view, retrieved on March 2021 and
- (iii) Content for vocational specialization. There are three types of contents: Basic of Expertise (C1), Basic of Expertise Program (C2), and Expertise Competence (C3)).

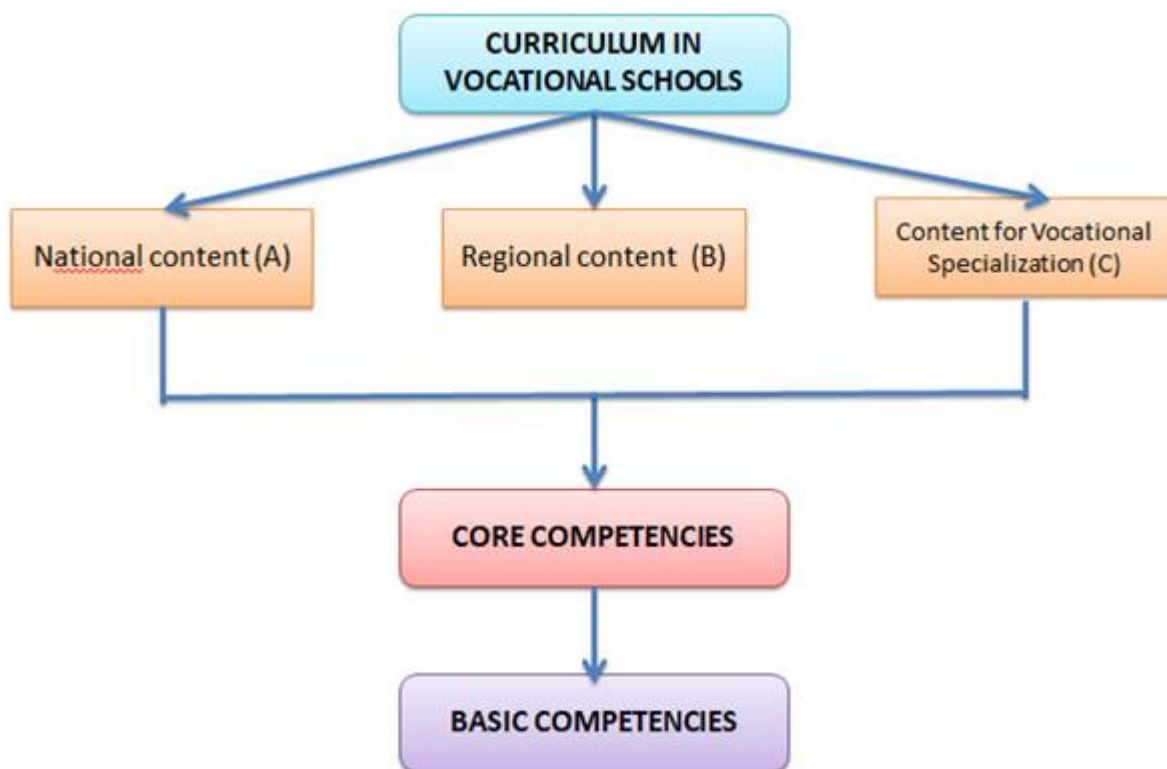


Figure 1. Correlation of curriculum, vocational school, and industry

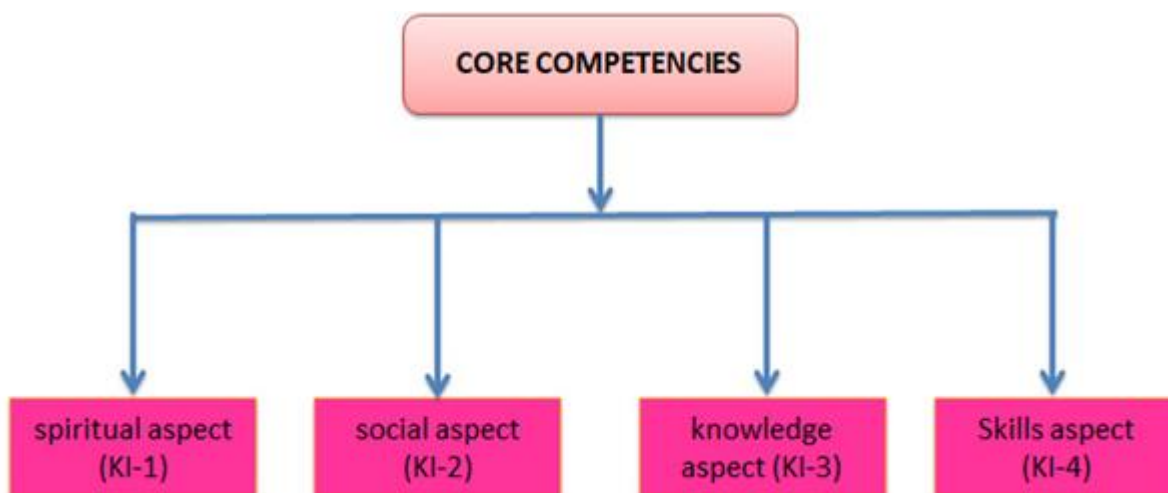


Figure 2. Classification of core competencies

Table 1 describes an example of core competency in science education in the national curriculum in vocational schools. The curriculum on science education is listed in core competencies 3 and 4 in the subject matter content of vocational specialization.

Table 1. The core competencies regarding science education materials in vocational schools. Data was obtained from <https://drive.google.com/file/d/1IAh-hkPgiTq4Pb8jkLL8Q-8Uaeyc0yV-/view> and https://vocational.schooln9bandung.sch.id/?page_id=23, retrieved on March 2021

CORE COMPETENCIES 3 (KNOWLEDGE)	CORE COMPETENCY 4 (SKILLS)
<p>3. Understand, apply, analyze, and evaluate factual, conceptual, basic operational, and metacognitive knowledge in accordance with the field and scope of Simulation and Digital Communication, and Basic Tourism Sector at the technical, specific, detailed, and complex level, relating to science and technology, arts, culture, and humanities in the context of developing self-potential as part of the family, school, world of work, national, as well as regional and international community members.</p>	<p>4. Take on specific tasks using tools/equipment, understanding information, and work procedures that are commonly carried out, and solve problems in accordance with the scope of Simulation and Digital Communication, and the Basic Tourism Sector. Show performance under the guidance with measurable quality and quantity in accordance with standard competencies.</p> <p>Demonstrate the skills of reasoning, doing, processing, and presenting effectively, creatively, productively, critically, individually and independently, collaboratively, communicatively, as well as solutely in the abstract realm relating to the development of what student learns at school and what is able to carry out specific tasks under direct supervision. Demonstrate skills in perceiving, readiness, and imitation, as well as getting used to (adaptive), proficient movements, making natural movements in the concrete realm relating to the development of what they have learned at school, and being able to carry out specific tasks under the supervision of life.</p>

Table 2 describes an example of basic competence in science education in the national curriculum in vocational schools. Basic competence is the elaboration of core competencies 3 and 4 in the subject matter of vocational specialization. The basic competencies regarding knowledge and skills consist of 14 materials on science education.

Table 2 . The basic competencies of science education materials in vocational secondary schools. Data was obtained from <https://drive.google.com/file/d/1IAh-hkPgiTq4Pb8jklL8Q-8Uaeyc0yV-/view> and https://vocational.schooln9bandung.sch.id/?page_id=23, retrieved on March 2021

BASIC COMPETENCIES 3		BASIC COMPETENCIES 4	
3.1	Applying physical quantities	4.1	Measuring physical quantities used in tourism
3.2	Analyzing the relationship between force, work, and energy in motion problem	4.2	Solving the problem of the motion of objects in tourism based on the concepts of force, work, and energy
3.3	Analyzing elasticity and surface tension	4.3	Conducting elasticity and surface tension experiments in tourism
3.4	Analyzing the relationship between temperature and heat	4.4	Conducting researches and experiments on the influence of heat on the changes in temperature, shape, and shape of objects in the tourism sector
3.5	Applying electric quantities	4.5	Calculating the cost of electrical energy used based on the use and technology of electronic equipment in the tourism sector.
3.6	Analyzing the material and its changes	4.6	Experimenting with material changes in the tourism sector
3.7	Analyzing mixtures and compounds	4.7	Conducting mixed and compound experiments in tourism
3.8	Analyzing solution and solution concentration	4.8	Make a solution at a certain concentration in the field Tourism
3.9	Analyzing acids, bases, and salts	4.9	Experiment with the properties of acids, bases, and salts in Tourism
3.10	Evaluating colloid system	4.10	Conducting experiments to prove the colloid system in tourism
3.11	Analyzing oxidation and reduction reactions	4.11	Conducting experiments on oxidation and reduction reactions in the tourism sector
3.12	Analyzing macromolecules	4.12	Qualitatively testing the carbohydrate content, protein, and fat in the ingredients used in tourism
3.13	Understanding the nature, types, and impacts of using polymers	4.13	Identifying the impact of using polymers in tourism
3.14	Analyzing the impact of pollution on ecosystem balance	4.14	Handling waste in the tourism sector to maintain the balance of the ecosystem

4. CONCLUSION

This study described the science education curriculum in vocational schools. Data collection was carried out using the literature review method. The results show that there are 3 groups of subject content, namely national content (A), regional content (B), and Vocational Specialization Content. Science education materials are contained in the national curriculum in vocational high schools for the content of vocational specialization (C1, C2, and C3). Science material is the basis for studying further material.

5. ACKNOWLEDGMENTS

We acknowledged Bangdos, Universitas Pendidikan Indonesia.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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