Relevance of the Building Engineering Education Program Curriculum with the Vocational High School (SMK) Construction Technology and Property Program

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Abstract. This research aims to determine the relevance level of the curriculum of the Building Engineering Education Program at Universitas Negeri Medan (Unimed) to the Learning Outcomes of the Construction and Property Engineering Program in the Merdeka Curriculum at Vocational High Schools (SMK). The objects of this research are the curriculum documents of the Building Engineering Education Program and the Learning Outcomes documents of the Construction and Property Engineering Program. This research uses a quantitative descriptive research method with the following stages: data collection, data reduction, data presentation, data verification, and conclusion drawing. The data collection techniques used are literature review, documentation, and interviews. The obtained data is analyzed by assessing the percentage of each competency or learning element of the Vocational High School (SMK) Construction and Property Engineering Program, and then the results are categorized according to the relevance level categories. The results show that the curriculum of the Building Engineering Education Program at Unimed is relevant to the competencies of the Vocational High School (SMK) Construction and Property Engineering Program, with a relevance level of 85%.

Keywords: Curriculum, Relevance, Building Engineering Education, Vocational High School, Construction and Property Engineering.

1 Introduction

Education is the process of learning and teaching aimed at developing an individual's knowledge, skills, and attitudes. This process can occur in various settings, such as schools, universities, workplaces, or even through daily life experiences and social interactions. The

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curriculum plays a central role in shaping the educational experience and ensuring that the teaching and learning process is conducted effectively and efficiently. The role of the curriculum in education is crucial, as it serves as the primary guide in the teaching and learning process. Education in Indonesia currently employs the Merdeka Curriculum. This curriculum approach aims to provide greater flexibility and freedom in the educational process. Overall, the Merdeka Curriculum seeks to develop a more adaptive, responsive educational system that focuses on individual student needs, with the goal of producing graduates who are better prepared to face real-world challenges.

Building engineering education is an academic program designed to train educators specializing in construction and building technology. This field includes five specific areas of expertise: Building Maintenance Technology, Civil Construction and Maintenance, Building Information Modeling and Design, Construction and Housing Technology, and Furniture. The Building Engineering Education Program (PTB) at UNIMED is a study program designed to produce future teachers specializing in Building Engineering for vocational schools (SMK). The curriculum includes Educational Foundation Courses, General Courses, Study Program Courses, and Elective Courses. The study program courses specifically support students in mastering building engineering competencies. To prepare professional educators or teachers, training is essential.There is a need to align the curriculum of the Building Engineering Education program with the operational curriculum of vocational schools (SMK) in the field of Construction and Building Technology.

2 Research Methods

The method used in this research is descriptive quantitative research. Descriptive research is a method for studying the status of a group of people, an object, a condition, or a system of thought (Leonard A. Jason, 2016). It serves to help provide a detailed description or depiction of the phenomenon being investigated. This research was conducted in the Building Engineering Education Program at the Faculty of Engineering, Universitas Negeri Medan, and at SMK Negeri 2 Kisaran. The research took place from August to September 2024. The objects of the study include the Merdeka Curriculum documents, the Syllabus (RPS) of the Building Engineering Education Program, and the Learning Outcomes documents of the Construction and Housing Engineering Program. The subjects of this research are vocational school (SMK) teachers in the Construction and Housing Engineering Program located in the North Sumatra region.

Data collection was carried out through literature review, documentation, and interviews, with analysis performed using descriptive quantitative methods. The collected data consists of numerical values that can be described verbally to make them easier to understand. The data is analyzed by calculating the percentage of each competency or element obtained to determine the average percentage score. The formula used is as follows.

$$Score\ Percentage = \frac{Total\ Score\ Obtained}{Total\ Possible\ Score} x100\%$$

The calculated score percentages are then analyzed and processed verbally so that the research findings are easier to understand.

Table 1. Curriculum Relevance Level Categories (Sugiono, 2013)

Category	Symbol	Indicator	Score
Highly Relevant	HR	If the overall PTB curriculum at the Faculty of Engineering, UNIMED is relevant to the competencies required by the SMK in the Construction and Property field and aligns with the Merdeka Curriculum.	80 - 100%
Moderately Relevant	MR	If parts of the PTB curriculum at the Faculty of Engineering, UNIMED are relevant to the competencies required by the SMK in the Construction and Property field and align with the Merdeka Curriculum.	20 - 79%
Not Relevant	NR	If the overall PTB curriculum at the Faculty of Engineering, UNIMED is not relevant to the competencies required by the SMK in the Construction and Property field and does not align with the Merdeka Curriculum.	< 20%

3 Result And Discussion

The following presents the results of the analysis of the content components or materials in the Building Engineering Education Program curriculum in relation to the SMK's Construction and Housing Engineering Program. Based on the alignment or relevance, the Learning Outcomes of the SMK's Construction and Housing Engineering Program are 85% related to the Course Learning Outcomes in the Syllabus (RPS) of the Building Engineering Education Program, placing it in the Highly Relevant (SR) category.

Table 2. Research Result in SMK Phase

Phase	Construction And Property Enginering (SMK)	Building Engineering Educational (PTB)	Relevance Level
	Course Name	Course Name	
E	Business processes in construction and housing work	Construction and Property Business Management	R
	Technological advancements and the construction and housing industries	-	NR
	Technological advancements and the construction and housing industries	-	NR
	Professions and entrepreneurship (job profiles and technopreneurship), as well as business opportunities in construction and housing	Construction Services Entrepreneurship Industrial Engineering	R R
	Fundamentals of construction and housing engineering	Building Countruction	R
	Health, Safety, Security, Environment, and industrial work culture	Basic Construction Health and Safety	R

Phase	Construction And Property Enginering (SMK)	Building Engineering Educational (PTB)	Relevance Level
	Course Name	Course Name	
	Structural analysis calculations	Basic Mechanics	R
		Structural Analysis	R
	Basics of building and housing construction	Building Material Pratices	R
		Concrete Testing	R
		Concrete Construction	R
		Wood Construction	R
		Steel Construction	R
		Soil Testing	R
	Land surveying	Fundamentals of Surveying and Mapping	R
		Geomatic and Geospatial Surveying	R
		Geographic Information Systems	R
	Technical drawing	Technical drawing	R
F	Planning of construction and housing projects	Simple Building Drawings	R
		Multi-Story Building Drawings	R
		Drawing with Software	R
		Building Planning and Environmental Engineering	R
	Execution of housing construction work	Masonry and Plumbing Practice	R
		Woodworking and Formwork Practice	R
	Supervision of housing construction work	Project Management	R
	Cost estimation for construction and housing	Construction Cost Estimate	R

3.1 The Comprehensive Business Process in the Construction And Housing Engineering Field

The comprehensive business process in the Construction And Housing Engineering field is one of the competencies or elements in the Merdeka Curriculum. According to the analysis results, the alignment of the main content of Construction And Housing Engineering Learning Outcomes with Courses Learning Outcomes Building Engineering Education Courses Program shows a 100% relevance and is categorized as Highly Relevant (SR). This topic is related to several courses in the PTB Program at UNIMED, including Technical Drawing, Drawing with Software, Basic Construction Safety, and Construction Management.

3.2 Element of Technological Development and Global Issues in Construction And Housing Engineering

Based on the analysis, the main content of the technological development and global issues element in Construction And Housing Engineering within the Courses Learning Outcomes of the Building Education Engineering Program at Unimed aligns with the Learning Outcomes of the Vocational School's Construction And Housing Engineering Program. This element includes two Learning Outcomes related to green building and suitable building. The material on green building and suitable building addresses environmentally friendly construction practices to reduce environmental damage (Engkus, 2019; Sahid dkk., 2020). For future development,

particularly in Indonesia, it is essential to understand advancements in green building and suitable building. This element covers new material not previously included in the 2013 Curriculum or its Revision.

3.3 Element of Technical Drawing

According to the analysis, the competencies in the Technical Drawing element of the Construction And Housing Engineering Learning Outcomes align 100% with the Learning Outcomes in the Syllabus (RPS) of the Building Engineering Education Program at UNIMED, categorizing it as Highly Relevant (SR). The Technical Drawing element includes six Learning Outcomes, five of which cover the use of drawing tools, drawing standards, basic orthogonal projection, basic pictorial projection, and manual drawing. These five Learning Outcomes are related to the Learning Outcomes of the Technical Drawing Syllabus (Efendi, 2020). The outcome related to drawing with software aligns with the Learning Outcomes of the Technical Drawing & Drawing with Software course. Based on interviews with Construction And Housing Engineering teachers, the Technical Drawing element has been effectively implemented in teaching at SMKN 2 Kisaran.

3.4 Element of Building Statics

The analysis indicates that the competencies in the Building Statics element of the Construction And Housing Engineering Learning Outcomes align 100% with the Learning Outcomes in the Syllabus (RPS) of the Building Engineering Education Program at the Faculty of Engineering, UNIMED, placing it in the Highly Relevant (SR) category (Julistiana, 2018). This element includes two Learning Outcomes: the study of building structure components and the calculation of axial force equilibrium. Both outcomes are aligned with the core content of Basic Mechanics and Structural Analysis Learning Outcomes. Interviews with Construction And Housing Engineering teachers reveal that the Building Statics element is effectively integrated into the curriculum at SMKN 2 Kisaran.

4 Conclusion

Based on the research findings, it can be concluded that the curriculum of the Building Engineering Education Program at FT UNIMED falls into the Highly Relevant (SR) category for the competencies of the SMK Program in Construction and Housing Engineering within the Merdeka Curriculum, with a relevance score of 85%. This relevance is based on the alignment between the Learning Outcomes of the Building Engineering Education Program at Unimed and the Learning Outcomes of the SMK Program in Construction and Housing Engineering under the Merdeka Curriculum. Some topics in the Learning Outcomes are not yet included in the courses or curriculum of the Building Engineering Education Program because they are new to the Merdeka Curriculum and were not present in the 2013 Curriculum or earlier curricula.

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