

# Analysis of The Use of Lecture Facilities in The Department of Mechanical Engineering Education Welcoming the Opening of New Study Program

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**Abstract.** This research aims to: 1) provide information for policy making related to strategies for meeting the needs of lecture spaces for opening new study programs, 2) making a map of space requirements based on KKN for each study program at the Faculty of Engineering. The research design is a type of ex post facto research with a descriptive approach. Ex post facto research aims to conduct a variable analysis or review of the conditions of existing infrastructure in the field. The results showed that the amount of study space needed for opening a new study program was 5 rooms. Availability obtained for the purposes of 5 new study programs is obtained from the efficient use of lecture rooms obtained as much as 1 study group room and mapping of existing infrastructure is obtained as many as 4 study groups.

**Keywords:** Analyst, facilities, opening of new study programs

## 1. Introduction

The need for adequate educational facilities, both in terms of the amount / ratio, variations in the types needed, and the quality is very necessary for the continuity of a quality learning process. Law No. 20 of 2003 concerning the National Education System, among others, emphasizes the need to develop national education standards, which include: content standards, process standards, graduate competency standards, teacher and education staff standards, facilities and infrastructure standards, management standards, financing standards, and assessment standards. and educational infrastructure is one of the important educational input elements and is a vital need for the implementation of a quality educational process [1]. Without adequate facilities and infrastructure, it is difficult to expect high-quality educational processes and results. The need for educational facilities is not enough that is directly related to learning and learning activities in the classroom such as: resource books, equipment, furniture, and educational media only.

The education process also requires educational facilities that indirectly support the implementation of learning and learning activities in the classroom such as the need for land, buildings or space, as well as equipment and furniture for the implementation of quality management [2]. The need for supporting facilities is needed to provide optimal services for the ongoing quality education process.

The Faculty of Engineering, Medan State University (FT Unimed) has experienced various important moments of change that have a significant influence on the development of the faculty. The conversion of FPTK to FT had a significant impact on the number of study

programs held and thus the increasing number of students studying at FT. The number of study programs held by FT in 2017 totaled 13 consisting of 8 undergraduate education study programs, 3 non-educational study programs and 2 non-educational D3 study programs. The current number of FT Universitas Negeri Medan students is 2,887 students. Meanwhile the design of facilities to support education by IDB donors is still at the stage of proposing proposals.

Thus, efforts are still needed to make efficient the existing infrastructure. In 2017 the Department of Mechanical Engineering Education has 6 classrooms, 6 labs / workshops. The construction of lecturer and laboratory rooms which are still lacking efforts will be completed within the next 5-7 years. The development costs are from PNBP Universitas Negeri Medan and the Islamic Development Bank (IDB). This study aims to determine:

- a. Mapping of lecture rooms at the Faculty of Engineering JPTM at this time.
- b. The possible space mapping is used as a lecture room in the Engineering Faculty JPTM at the opening of the new study program in 2020.
- c. Providing information for overall policy making related to lecture space fulfillment strategies for the new study program 2020.

The need for adequate educational facilities, both in terms of the amount / ratio, variation in the types needed, as well as the quality for the ongoing educational process and the achievement of excellent quality educational outcomes, is not negotiable. Therefore, educational facilities are very important and some of them (sources and learning media) are often referred to as the window of science and technology [3]. The absence of educational facilities in learning tends to make students learn verbally, and this is a form of intellectual suppression.

The need for educational facilities is not enough that is directly related to learning and learning activities in the classroom such as: resource books, equipment, furniture, and educational media only. Education in schools also requires educational facilities that indirectly support the implementation of learning and learning activities in the classroom such as the need for land, buildings or space, as well as equipment and furniture for the implementation of quality school management. The need for educational facilities like this is minimally adjusted to the level of needs, types, and functions [2]. The need for supporting facilities is needed to provide optimal services for the ongoing quality education process.

In recent years the government has begun to realize the importance of clear education standards that can be referred to by every education provider both at the national and regional levels. In connection with standards for educational facilities, Government Regulation No. 19 of 2005 concerning National Education Standards states that each education unit must have facilities which include furniture, educational equipment, educational media, books and other learning resources, consumables, and other equipment needed to support an orderly and continuous learning process, such as building and land use [4]. This Government Regulation does not further elaborate on the types and specifications of essential education facilities and the minimum level of need for each school at each level and type of education program. Likewise, the details regarding the need for essential and minimal facilities for each type of education management activities, teaching and learning process, and program evaluation process. In connection with that, we need an analysis of the needs of educational facilities in accordance with the expected standards both regarding the number / ratio, variations in type, and quality level.

In accordance with Law No. 20 of 2003, funding for the implementation of education is a joint responsibility of the central government, regional governments and the community [1]. This means that the budget for the provision of educational facilities is also a shared responsibility between the central government, regional governments and the community. The

limited budget that is owned by the central and regional government implies that the local government has a clear data base on the type and minimum level of need for educational facilities at every level of education, even for each type of education implementation activity. In addition, the ability of the community to provide educational facilities in their regions in accordance with their socioeconomic conditions also needs to be identified. Therefore, scientific studies are needed about the feasibility of existing educational facilities, their urgency, targeting accuracy, and their contribution to improving the educational process and outcomes.

The availability of adequate school education facilities is suspected to have a strong correlation with improving the quality of the process and learning outcomes of education programs in schools [5]. In this case, educational facilities, especially those concerning learning facilities, learning resources, and learning media are thought to have a strong influence on the expected learning outcomes [6]. Appropriate learning tools, in addition to being an educational medium (learning) that will help facilitate the child's thought process through the concretization of abstract objects and can also be the learning objects itself that will help students understand natural, social, cultural phenomena, and technology directly. Involving the learning process directly, intactly, comprehensively, and powerful clearly helps students realize their learning potential optimally [5][2].

Educational facilities and infrastructure, especially land, buildings and educational equipment should describe the ongoing curriculum implementation program of the institution. The building and learning equipment are held based on the applicable curriculum or educational programs, so that with the suitability it allows the existing facilities to really support the process of education and learning.

## **2. Research Methodology**

The place of research is JPTM Faculty of Engineering, Medan State University. This research is planned for 6 months, starting from May 2017 until October 2017. The research design that will be used is classified as ex post facto research using a descriptive approach. Ex post facto research aims to conduct a variable analysis (data) or a review of the condition of infrastructure especially lectures in the field. Based on the facts of the review of the conditions in the field, a mapping of the required infrastructure will be made based on the IQF curriculum which will be applied in the new Study Program in 2020.

## **3. Results and Discussion**

### **3.1 Development of JPTM Laboratories and Workshops**

In 2017 JPTM FT Universitas Negeri Medan will propose the opening of 5 new Study Programs as follows; (1) Mechanical Engineering, (2) Material Engineering, (3) Metallurgical Engineering, (4) Chemical Engineering, and (5) Material Engineering. Along with the proposal of the new Study Program, as well as referring based on the need to implement the KKNI curriculum by referring to the establishment of lecturers KDBK in each Department and Study Program, the JPTM FT Universitas Negeri Medan will also develop Laboratories and Workshops as presented in table 1 below:

**Table 1.** Development of JPTM Laboratories and Workshops

No	Original	Becomes
1	[1] WS Mechanical Engineering	[1] WS Metal Machining and Fabrication
2	[2] Mechatronics Laboratory	[2] Mechatronic Laboratory
3	[3] Automotive Education laboratories	[3] WS Automotive Maintenance and Repair
		[4] Automotive Performance Testing Laboratory
4	[4] CAD Laboratory and Image Studio	[5] Design and Construction Laboratory
		[6] Material Testing Laboratory

As a consequence of the opening and development of the new Study Program and Lab / WS, FT Unimed for the past three decades, patchwork has been added and is limited to learning space and office facilities. For the lecturer and workshop room the addition is still minimal. Another more crucial challenge is the age of buildings and their equipment, especially power lines and other utilities in order to meet the standards of adequacy, safety and efficiency. Considering the limited funds available, the demands of stakeholders and the demands of the development of learning technology, integrated planning is needed between funds, target spending and travel time. To support the opening of new study programs and lab / WS development as well as to strengthen the implementation of the IQF, it is necessary to make efficient use of the existing space and look for opportunities to optimize learning facilities in JPTM FT Universitas Negeri Medan to be used as lecturing facilities ahead of the construction of the new FT building in 2020.

Therefore, it is necessary to solve the problems of infrastructure related to the adequacy of limited conditions, namely: (1) how much efficiency and prediction index of calculation of JPTM FT Universitas Negeri Medan education infrastructure. (2) how much is the need and lack of educational infrastructure to support the implementation and development of study programs in JPTM FT Universitas Negeri Medan. (3) how are the priorities and efforts to provide educational infrastructure related to the limited funds available.

### 3.2 College Facilities Efficiency

Lecture facility efficiency is presented in table 2 below:

**Tabel 2.** College Facilities Efficiency

No	Room Name	Room Kode	Clock			Efficiency (%)
			Used (min/week)	Available (min/week)	empty minutes/week	
1	Lecture Room	89.3.01	2220	2700	480	82,22
2	Lecture Room	08.1.06	2190	2700	510	81,11
3	Lecture Room	08.1.07	2360	2700	340	87,41
4	Lecture Room	08.2.01	1600	2700	1100	59,26
5	Lecture Room	08.2.02	2010	2700	690	74,44
6	Lecture Room	08.1.05	1900	2700	800	70,37
<b>TOTAL</b>			<b>12280</b>	<b>16200</b>	<b>3920</b>	<b>75,80</b>
7	Lab CAD	07.1.11	1380	2700	1320	51,11
8	Lab. CNC	79.1.03	300	2700	2400	11,11
9	Lab. Mechatronics	89.1.01	1420	2700	1280	52,59
10	Lab. Production	79.1.01	760	2700	1940	28,15

No	Room Name	Room Kode	Clock			Efficiency ( % )
			Used (min/week)	Available (min/week)	empty minutes/week	
11	Lab. Automotive	118.1.01	960	2700	1740	35,56
12	Image Studio	08.2.03	150	2700	2550	5,56
13	Manufacturing Workshop	97.1.01	980	2700	1720	36,30
14	Production Workshop	97.1.01	880	2700	1820	32,59
<b>TOTAL</b>			<b>6830</b>	<b>21600</b>	<b>14770</b>	31,62

Based on the efficient use of lecture rooms in the even semester of 2016/2017, there will be an opportunity for the availability of lecture facilities to obtain an average classroom use efficiency of 75, 80%, while the efficient use of learning spaces in laboratories and workshops is 31.62%.

### 3.3 Analysis of Availability of Classrooms for New Study Programs

Opportunities for availability of lecture facilities for 5 new study programs in 2020 based on the efficient use of lecture rooms. Assumption: All old study programs are assumed not to add classes. All new study programs will only open 1 class, the number of courses in the even semester = odd semester Total semester credits 22 credits = 2200 minutes / week. Needs of hours to be provided = 2200 min / week x 5 study rooms = 11,000 min / week, number of hours available 3,920 minutes / week. 3,920 minutes / week < 11,000 minutes / week, or can only provide for 1 class of 2,200 hours / week. Conclusion the need for lecture rooms for 5 new study programs in 2018 has not been fulfilled, the remaining lecture hours remaining 1,720 minutes / week.

Opportunities for availability of lecture facilities for 4 new study programs in 2020 based on the mapping of existing infrastructure. The lecture infrastructure that can be converted into lecture rooms is as follows; (1) Automotive Workshop B can be converted into 2 lecture halls, (2) Ex Lab CNC Room (2 rooms). So the need for lecture rooms for 5 new study programs can be met.

## 4. Conclusions

The need for lecture rooms for 5 new study programs in 2020 has not been fulfilled, the remaining lecture room hours remaining 1,720 minutes / week, so it is recommended that the lecture halls can be affected by the Automotive B workshop can be converted into 2 study rooms.

With the current development of Blended Learning, it is expected that lecturers who have applied it in lectures, the study program should arrange an integrated lecture schedule and recovery program.

## 5. References

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