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EVALUATION OF COMPUTER LABORATORY SPACE DURING THE COVID-19 PANDEMIC AT SMK NEGERI 7 BALEENDAH

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Abstract - This study aims to obtain an overview of the condition and availability of facilities and infrastructure for the computer laboratory room for the Modeling and Building Information Design (DPIB) program at SMK Negeri 7 Baleendah based on Permendikbud No. standards. 34 of 2018. The purpose of this study was also to assess the fulfillment of health protocol facilities at SMK Negeri 7 Baleendah and to obtain a computer laboratory layout plan that complies with health protocol rules during the Covid-19 pandemic. This research is an evaluation research. Data collection techniques in this study by means of observation and documentation. The results of this study indicate the level of achievement of facilities and infrastructure at SMK Negeri 7 Baleendah based on Permendikbud No. standards. 34 of 2018 it reached 83% in computer laboratory room infrastructure, its achievement was included in the very feasible criteria and in the facilities it reached 72.91% which was included in the feasible criteria. The results of the evaluation on health protocol facilities based on existing standards had not been fulfilled, the sink near the computer laboratory room did not provide hand washing soap, and the layout of the computer laboratory room had not been spaced 1.5 meters apart. Design recommendations for the computer laboratory room for the DPIB program at SMK Negeri 7 Baleendah by changing the type of opening, the position of the sink placed next to the entrance to the computer laboratory room and the room layout spaced 1.5 meters apart on each seat. The results of the evaluation on health protocol facilities based on existing standards had not been fulfilled, the sink near the computer laboratory room did not provide hand washing soap, and the layout of the computer laboratory room had not been spaced 1.5 meters apart. Design recommendations for the computer laboratory room for the DPIB program at SMK Negeri 7 Baleendah by changing the type of opening, the position of the sink placed next to the entrance to the computer laboratory room and the room layout spaced 1.5 meters apart on each seat. The results of the evaluation on health protocol facilities based on existing standards had not been fulfilled, the sink near the computer laboratory room did not provide hand washing soap, and the layout of the computer laboratory room had not been spaced 1.5 meters apart. Design recommendations for the computer laboratory room for the DPIB program at SMK Negeri 7 Baleendah by changing the type of opening, the position of the sink placed next to the entrance to the computer laboratory room and the room layout spaced 1.5 meters apart on each seat.

Keywords– Computer Laboratories, Facilities and Infrastructure, Health Protocol Facilities, Standard Computer Laboratory Facilities

INTRODUCTION

Facilities and infrastructure is one way to achieve an increase in education. As stated in Law No. 20 of 2003, education is a planned effort in creating an atmosphere and learning process so that students can develop activities to have the religious strength, self-control, wisdom, intelligence, noble character, and skilled abilities needed. for himself, society, and nation and state. Vocational High School (SMK) is a formal education at the secondary education level that organizes vocational programs to prepare graduates to work in certain fields. The main objective of vocational education is to grow a workforce that can meet the needs of the labor market and is able to utilize and is oriented by the growth of knowledge, technology, and art (Law No.20 of 2003). In addition to providing manpower, Vocational High Schools also prepare their graduates to become entrepreneurs and be able to continue their education at a higher level (Susanto & Sudira, 2016)(Ghassani et al., 2019).

Baleendah State Vocational School 7 is a vocational school that organizes a learning process so that its graduates are educated, trained, and have attitudes that can adapt to industrial developments, and can compete in meeting the needs of the workforce in the future, this is stated in the vision and mission of SMK Negeri 7 Baleendah. to educate graduates who are outstanding, efficient, and able to compete, it is necessary to be equipped with the provision of facilities and infrastructure that are in accordance with the needs and can influence the student teaching and learning process. Given how important facilities and infrastructure are, it is necessary to identify the feasibility of facilities and infrastructure and one of them is the computer laboratory room in the Modeling and Building Information Design (DPIB) expertise competency at SMKN 7 Baleendah.

The Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) is currently directing to hold Limited Face-to-Face Learning (PTMT) during the Covid-19 pandemic. The PTMT concept is setting the number of students in each class so that the number becomes less than the normal number, which is a maximum of 50% of the number of students in one classroom. He did this so that teaching and learning activities could be carried out smoothly but still prioritize caution, health, and safety for all school members(Permana & Wijaya, 2017)(Permana et al., 2019).

In practical subjects at SMK Negeri 7 Baleendah teaching and learning activities have been carried out offline/face-to-face by applying limited face-to-face learning. One of the rooms used for learning activities is a computer laboratory room. The fulfillment of facilities and infrastructure as well as the condition of the DPIB program computer laboratory at SMKN 7 Baleendah during the Covid-19 pandemic needs to be considered. Preparing health protocol facilities, such as a place to wash hands with soap, provision of hand sanitizers and seating arrangements is one of the main keys so that the implementation of learning can be carried out smoothly and still avoid transmission of the coronavirus(Permana et al., 2020)(Permana et al., 2022). However, the provision of health protocol facilities at SMK Negeri 7 Baleendah is currently still limited and the arrangement of learning spaces has also not been changed(Permana et al., 2021). The air quality in the computer laboratory room is also not good because the openings and ventilation of the room are not functioning optimally. Because of this background, the researcher intends to carry out a study entitled "Evaluation of Computer Laboratory Space During the Covid-19 Pandemic at SMK Negeri 7 Baleendah".

METHOD

Research methods

This research was conducted at SMK Negeri 7 Baleendah. The research is focused on the computer laboratory room for the Design Modeling and Building Information Expertise program. Research conducted using evaluation research methods. Using this research method to seek factual truth and information by comparing the real conditions of room comfort, completeness of health protocol facilities, and computer laboratory facilities and infrastructure at SMK Negeri 7 Baleendah with the standards in Permendikbud No. 34 of 2018 concerning SMK Facilities and Infrastructure Standards, Guidelines for Organizing Learning During the Covid-19 Pandemic, and Room Comfort Standards based on SNI. As for the steps taken by researchers in evaluation research, namely (1) The reason for conducting evaluation research on computer laboratories is to find out the suitability of existing facilities and infrastructure in the computer laboratory room with existing standards. As well as the availability of health protocol facilities at SMK Negeri 7 Baleendah. (2) In this study what will be evaluated are the computer laboratory facilities and infrastructure and health protocol facilities at SMK Negeri 7 Baleendah. (3) Collect data or information needed to support the evaluation. Data or information collected by direct observation and measurement to the research location. (4) Reports generated from this research are in the form of conclusions from the results of observations and

measurements. And from the evaluation results are given recommendations(Rinaldi & Permana, 2019)(Kencanasari et al., 2020).

Research variable

This study uses one variable or a single variable which does not discuss an effect or correlation. The variables of this study assessed the feasibility of the room area, room furniture, educational equipment and educational media in the computer laboratory room at the DPIB program at SMK Negeri 7 Baleendah. As well as comfortable room temperature, lighting, air conditioning, and the availability of health protocol facilities.

Data collection technique

Data collection techniques are methods used to collect data that support the achievement of research objectives. In this study, the data collection techniques used were:

1. Documentation

   The documents used in this research include:

   a. Working picture of DPIB program practice room at SMK Negeri 7 Baleendah
   b. Photographs of practice room documentation
   c. Lamp. Permendikbud No.34 of 2018 regarding the standard of facilities and infrastructure
   d. Guidebook for Organizing Learning in 2020/2021 during the Covid-19 Pandemic
   e. Indonesian thermal comfort standard

2. Observation

Observation is a direct observation of the location to obtain factual data related to research. Data is collected using tools so that the research object can be examined clearly (Sugiyono, 2012). These observations and measurements were carried out to (1) determine room conditions, temperature measurements, lighting, and air velocity in the DPIB program practice room at SMK Negeri 7 Baleendah, (2) find out the condition of the practice room facilities and infrastructure. After that, it is compared with the data from the observations with regulatory standards and literature studies. In this study, researchers used alux meterr to measure room lighting, a thermometer to measure room temperature, and an anemometer to measure air velocity.

Data analysis technique

The results of observations and measurements in this study will be analyzed using descriptive statistical analysis techniques, which are statistics used to analyze data by describing the data that has been collected as it is without intending to make general conclusions or generalizations. In this data analysis using a percentage scale with the following formula:

$$\text{Pencapaian} = \frac{skor\ riil}{skor\ ideal}\ x\ 100\%$$

The achievement criteria are as follows:

Very Worth it	= 76% - 100%	No Flyover	= 26% - 50%
Worthy	= 51% - 75%	Very Unworthy	= 0% - 25%

RESULTS AND DISCUSSION

Computer Laboratory Room Analysis

The DPIB program computer laboratory room at SMK Negeri 7 Baleendah has a room area of 96m², with a length of 12 meters and a width of 8 meters, and a height of approximately 4 meters. This room faces the Northwest. The type of door used in the computer laboratory room uses a double swing door. The window used is a top-hung casement-type window that opens upwards. This window is combined with a stationary window that cannot be opened or closed and is placed between the top-hung casement windows. In the computer laboratory room, inlet and outlet rules have been implemented, but for different elevation rules, they have not been implemented. The elevation in the computer lab room is still level.

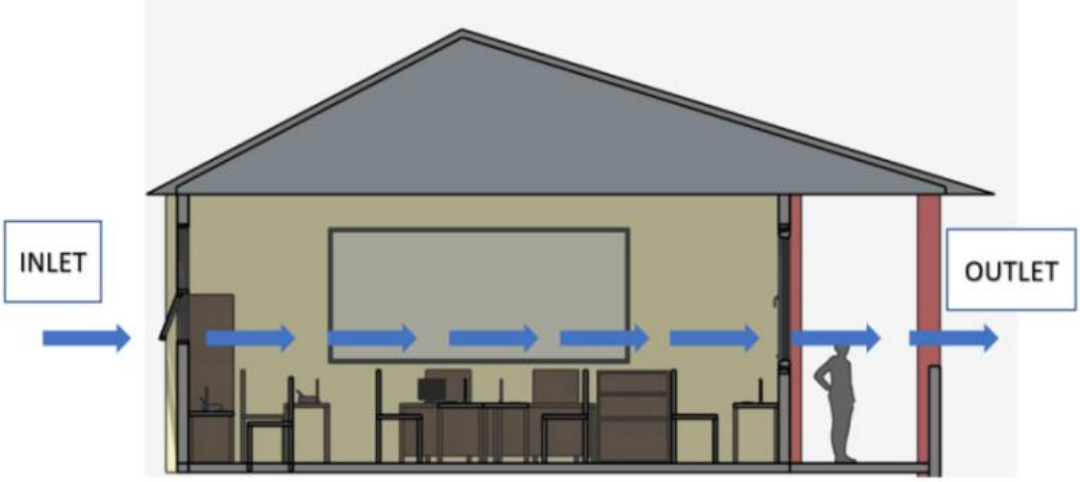


Figure 3.1 Slice of Computer Laboratory Room

Computer laboratory room users are teachers and students. The number of students in one class is 31 students. Due to the Covid-19 pandemic, limited face-to-face learning (PTMT) was implemented so that the number of students who entered the class during the Covid-19 pandemic was only 50% of the number of one class, namely 15-16 students. Activities carried out by teachers and students before entering the room must wash their hands or use a hand sanitizer first because learning activities are carried out during the Covid-19 pandemic. On the 2nd floor, right beside the computer laboratory room, there is a sink for washing hands before entering the classroom. However, the placement of the sink is still not optimal, apart from being far from the entrance to the computer laboratory room,

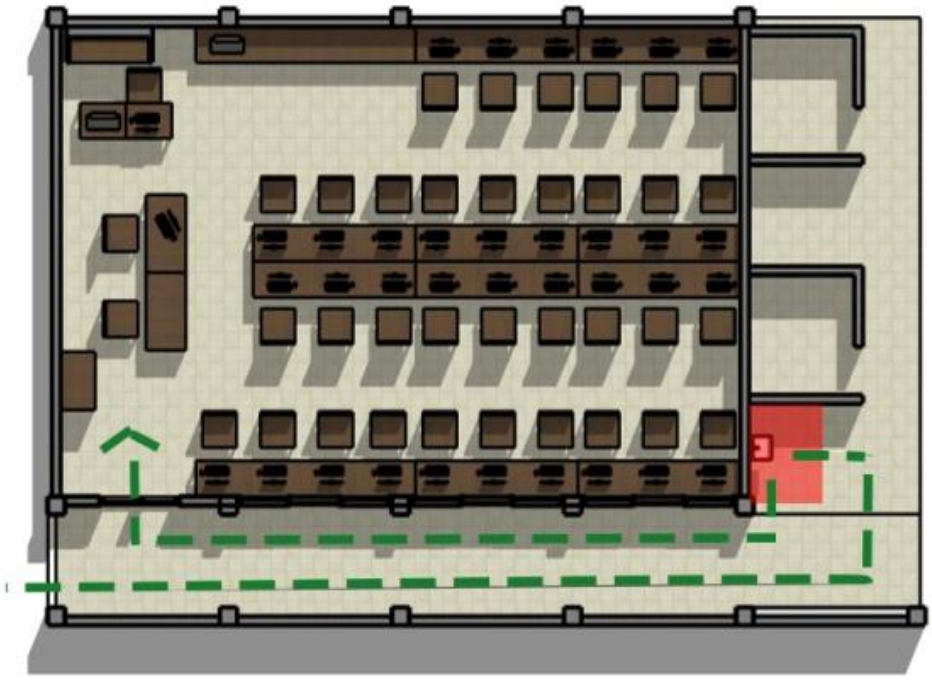


Figure 3.2 Top View of Sink Position and Circulation Line

When the lesson begins the teacher walks around the class several times to see the work of the students. Circulation, when the teacher is going around to see the work of students when they meet the end of the road, makes the teacher have to turn back to see the work of students who are on the other side of the table. Then the computer desk in the computer laboratory room has also not been spaced according to the health protocol and is still facing each other. Layouts that face students face to face are not appropriate during the Covid-19 pandemic

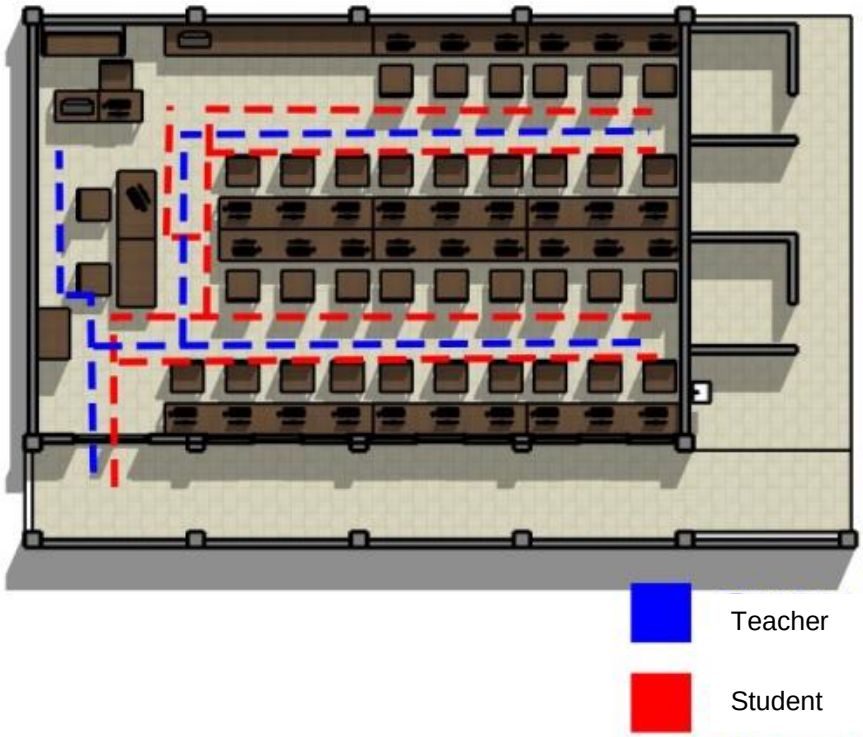


Figure 3.3 Teacher and Student Activity Rate

Research result

The comfort conditions measured in this study were thermal comfort measurements which included temperature and wind speed measurements and visuals which included room lighting in the DPIB program computer laboratory at SMK Negeri 7 Baleendah.

Figure 3.4 Position of Measure Points

Measurements are made by dividing into several points in space. In the research process and measurements were also carried out at 07.00 WIB, 10.00 WIB and 15.00 WIB.

a. Results and Discussion of Wind Speed Measurements

The instrument used to measure wind speed is an anemometer. According to MENKES No.261/MENKES/SK/11/1998, the ventilation rate for a healthy room is 0.15 - 0.25 m/s. Based on the results of measurements in the computer laboratory room of the DPIB program at SMK Negeri 7

Baleendah, it has an average wind speed of 0.043 m/s. To maintain comfortable conditions, the air velocity in the computer laboratory room has not met the standards. However, from the data obtained, in the opinion of the students, the condition of wind speed in the computer laboratory room when the window was opened was quite tight and when the window was closed, the room was hot.

Table 1 Wind Speed Measurement Results

Measurement results				Indoor Air Speed Standard (m/s)
Measurement Time	Wind Measurement Point Position			
	Table 1	Table 2	Table 3	
07.00	0.06m/s	0.10m/s	0.14m/s	0.15 – 0.25m/s
10.00	0m/s	0m/s	0.09m/s	
15.00	0m/s	0m/s	0m/s	
Average	0.02m/s	0.03m/s	0.08m/s	
Total average	0.043m/s			

The measurement results are affected by the openings in the computer laboratory room which have not applied elevation at the inlet and outlet. The area of openings in the computer laboratory room is also not appropriate. In building physics book 1 there is a minimum area of an air inlet, which is based on the area of the facade wall of the room by 40% -80% of the wall area and based on the area of the room by 20% of the room area. In the DPIB program computer laboratory room at SMK Negeri 7 Baleendah, the area of the inlet opening is only 13.8%. The standard requirement for air change per hour (ACH) in the laboratory room is 6. Based on the results of calculating the air change that occurs in the computer laboratory room for the DPIB program at SMK Negeri 7 Baleendah it is 2.6 which does not meet the standard.

b. Results and Discussion of Light Measurements

The measuring instrument is placed at the main measuring point, namely the measuring point with the right position in the middle. This measuring point represents all points measuring the strength of the lighting in the work area. The measuring instrument used is the lux meter.

Table 2 Light Measurement Results

Measurement results				Lighting Standard
Measurement Time	Light Measuring Point Position			
	Table 1	Table 2	Table 3	
07.00	60	132	155	250
10.00	224	458	447	
15.00	246	253	216	
Average	176,67	281	272.67	
Total average	243,44			

From the measurement results obtained in the computer laboratory room, the average natural lighting is 234.44lux. Based on the lighting standard in Indonesia, which is 200lux. The size of the lighting in the DPIB program computer laboratory room at SMK Negeri 7 Baleendah has met the minimum requirements according to existing standards. By utilizing natural lighting in the DPIB computer laboratory room at SMK Negeri 7 Baleendah, we can save electrical energy for artificial lighting. In building physics book 1 the minimum area for light openings is 20% of the facade area (window-to-wall ratio/WWR). The average area of light openings in the computer laboratory room of the DPIB program at SMK Negeri 7 Baleendah based on the calculations in the appendix is 27.5%.

c. Results and Discussion of Temperature Measurements

The measuring instrument used to measure room temperature is a thermometer. From the results of the data obtained, in the opinion of the students, it was stated that the room temperature in the morning and evening was quite cool, whereas during the day it was hot.

Table 3 Temperature Measurement Results

Measurement Time	*Measurement results*	*Room Temperature Comfort Standard*
07.00	*24oC*	*18oC – 26oC*
10.00	*27.2oC*	
15.00	*29.4oC*	
Average	*26.7oC*	

Based on the results of temperature measurements which can be seen in the table above, the DPIB program computer laboratory at SMK Negeri 7 Baleendah has an average temperature of 26.7ºC. From these results, the temperature in the computer laboratory room does not meet room temperature standards based on MENKES No.261/MENKES/SK/11/1998, namely 18ºC - 26ºC. Air velocity is very influential on room temperature. The higher the speed of the air spread in the room, the more air will enter and cause the temperature in a room to be low. Because the air speed in the computer laboratory room does not meet the standards, this causes the room temperature in the computer laboratory to become hotter.

d. Feasibility Level of DPIB Program Computer Laboratory Facilities and Infrastructure

From the research results obtained, it will be converted into a scale of 1-4 which is equated with the minimum standard of facilities and infrastructure based on Permendikbud No. 34 of 2018. After that the data is processed into a percentage scale which will produce conclusions about the level of achievement. Following are the results of observations regarding the infrastructure in the DPIB computer laboratory room at SMK Negeri 7 Baleendah.

Table 4 Observation Results of Computer Laboratory Room Infrastructure

No	*Type*	*Observation results*	*Standard*	*Ideal Score*	*Real Score*
1	*Learner Capacity*	*31 people*	*36 people*	*4*	*4*
2	*Computer Laboratory Area*	*96 m2*	*Size min. 150 m2 Includes machine and computer design practice rooms, instructor rooms and storage*	*4*	*3*
3	*Room Area Ratio per Student*	*3 m2*	*3 m2/student*	*4*	*3*
Total Score				*12*	*10*
Percentage				*83%*	

Based on the feasibility percentage of the DPIB computer laboratory room infrastructure at SMK Negeri 7 Baleendah, the results achieved were 83%, so the level of achievement was included in the very feasible criteria.

The following is observational data regarding the facilities in the DPIB computer laboratory room at SMK Negeri 7 Baleendah:

Table 5 Observation Results of Computer Laboratory Room Facilities

Type	Standard	Observation Results	suitability		Ideal Score	Real Score
			In accordance	No		
a. Student seat	1 fruit/student	31 pcs	v		4	4
b. Menja students	1 fruit/student	31 pcs	V		4	4
c. Teacher's chair	1 piece/master	1 piece	V		4	4
d. Teacher's desk	1 pcs. guru	1 piece	V		4	4
e. Computer	Minimum number of students	31 pcs	V		4	3
f. Intranet and internet connection	1 set/school	-	-	-	4	1
g. Electric socket	6 pieces/room	10 pieces	v	-	4	1
h. Hygiene tools	Minimum 1 set/room	-	-	-	4	1
i. K3 tools	Minimum 1 set/room	-	-	-	4	1
j. Wall clock	1pc/room	-	-	-	4	1
k. Whiteboard	1pc/room	1 piece	V		4	4
i. Projector	1pc/room	1 piece	v		4	4
Total Score					48	35
Percentage					72.91%	

Based on the feasibility percentage of DPIB program computer laboratory facilities at SMK Negeri 7 Baleendah, the results achieved were 72.91%, so the level of achievement was included in the eligibility criteria. The results of the data in the table show that there are still several facilities that are not yet available in the computer laboratory room, such as wall clocks, cleaning tools, K3 tools and internet connections. The internet connection in the computer laboratory room was cut off because at the start of the pandemic the school was closed and learning was being carried out online at home. So that when starting face-to-face learning, the internet connection is limited and has not been installed yet.

e. Level of Availability of Health Protocol Facilities

Face-to-face teaching and learning activities are limited during the Covid-19 pandemic and must comply with health protocol rules set by the government. Baleendah State Vocational School 7 in practical subjects have carried out direct learning. The following is observational data on the availability of health protocol facilities at SMK Negeri 7 Baleendah:

1. Availability of sanitation and hygiene facilities
   a. Clean restrooms
      There is a toilet next to the computer laboratory room, but the cleanliness of the toilet is still not clean because the toilet floor and toilet walls are quite dirty.
   b. Handwashing with soap (CTPS) facility with running water using soap near the computer laboratory room does not provide soap for hand washing. The handsanitizer has been fulfilled because there are hand sanitizers in all rooms.
   c. Disinfectant
      The guidebook for organizing learning during the Covid-19 pandemic states that before and after learning, disinfectant spraying is carried out on the infrastructure and environment of the education unit. However, disinfectant liquid at SMK Negeri 7 Baleendah is not available.
2. Readiness to apply mask mandatory area
   All school residents at SMK Negeri 7 Baleendah are obedient in using masks. Even during learning activities, students continue to wear masks until the learning activity is complete.
3. Have a thermogenic (measuring body temperature shot)

The body temperature gauge (thermogenic) at SMK Negeri 7 Baleendah does not work. Before entering the room the students did not measure their body temperature first because a thermos gun was not available.

4. Dividing study groups and setting lesson schedules for one class.
   To avoid crowds and reduce the rate of spread of Covid-19, each class that conducts offline learning in the DPIB computer laboratory room at Baleendah State Vocational High School 7 has divided study groups. In one class divided into 8 groups. For groups of 1 to 4 hours of lessons starting at 07.00 to 11.00, groups of 5 to 8 hours of lessons starting at 12.00 – 16.00. So that even though teaching and learning activities are carried out offline in the laboratory room, there are still no crowds.
5. Make arrangements in the layout of the study room by paying attention to:
   a. The minimum distance between seats is 1.5 meters and a sign is given to keep your distance During teaching and learning activities, the layout of the computer laboratory room has not changed the seating position. The sitting position of the students has also not been given a sign of keeping their distance.
   b. Sufficient open spaces and air ducts to ensure good air circulation.
      Air ventilation in the computer laboratory room has not been sufficient for the opening space. The movement of air in the room cannot be felt, so during the day and evening, the computer laboratory room is quite hot.

Design Recommendations

a. Room Layouts

In the recommendation for the layout design of the computer laboratory room for the DPIB program at SMK Negeri 7 Baleendah, to reduce the rate of spread of Covid-19, there has been a 50% reduction from the original 31 seats to 16, and the arrangement between seats with a distance of 1.5 meters according to standard health protocols. In addition, the student's seating position is arranged so that it is not face-to-face with other students. The teacher's circulation pattern which was previously deadlocked which can be seen in Figure 3.1, has been implemented in a circular circulation so that it becomes more dynamic and the teacher can walk around to check student work. With adjustments that have been arranged, students can take turns carrying out practices in the computer lab with a predetermined schedule, and every time students finish practicing, the seating area,

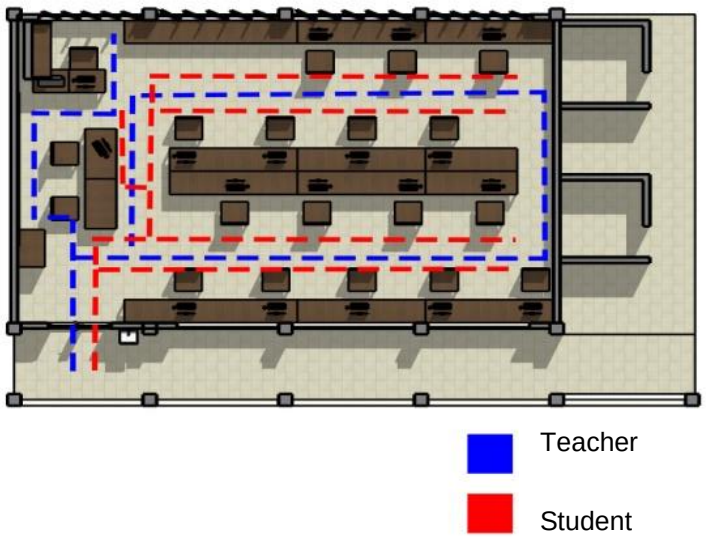


Figure 3.DPIB Program Computer Laboratory Layout Design Recommendations at SMK Negeri 7 Baleendah

The positioning of the computer equipment in the position facing the windows on the inlet and outlet sections will not be dazzled because outside there is a roof that functions as a shade, as well as the choice of color and type of glass in the recommended design according to the needs in the

field, namely by choosing Indofood clear glass which has a gray color, so can reduce the glare effect. The choice of paint for the laboratory room is also matte gray, with a color that tends not to reflect light, coupled with a rough surface which further reduces the glare effect of excess natural light.

b. Laying the Sink

The recommendation for placing a handwashing area/sink next to the entrance is shown in Figure 3.2. This is done so that in addition to making it easier for room users to reach the sink, it is hoped that it can reduce queues passing each other. So as to reduce the risk of transmission.

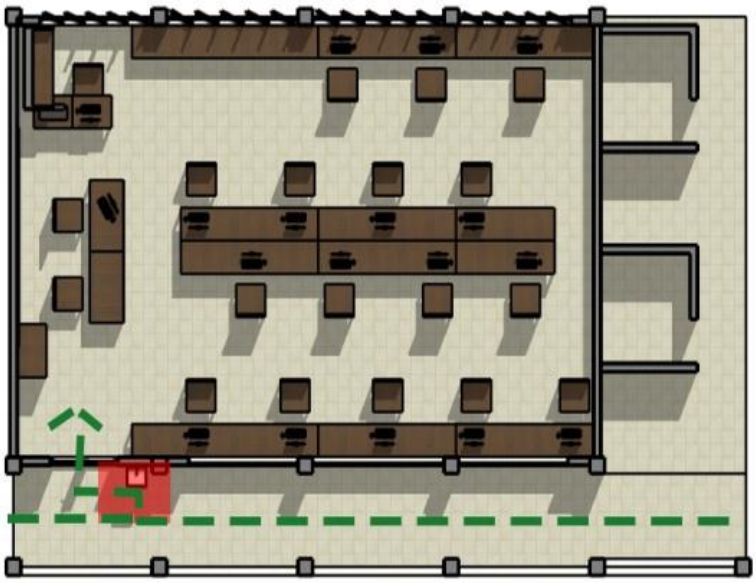
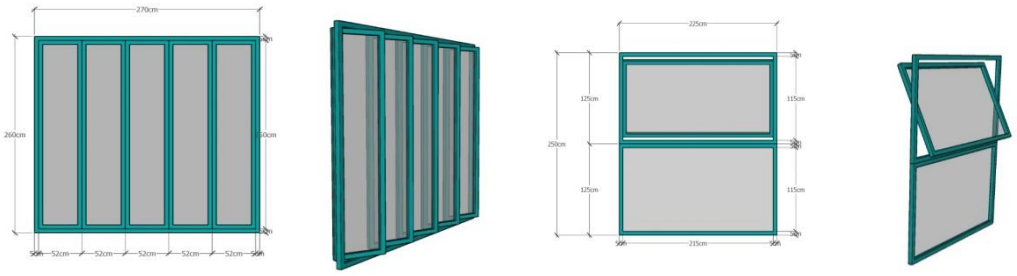


Figure 3. Sink Laying Design Recommendations

c. Computer Laboratory Room Openings

From the results of wind speed measurements, the opening conditions in the DPIB program computer laboratory at SMK Negeri 7 Baleendah still do not meet the needs. Design recommendations for computer laboratory room openings have been adjusted according to needs, and the inlet and outlet types have been changed. The inlet opening type uses a side-hung casement and an outlet with a horizontal pivoted type. The application of openings in the SMK 7 Baleendah laboratory is 50%, besides that the selection of Casement Side Hung opening types has an effectiveness of entering air by 90%, so according to the formula and calculations the Air Flow that occurs is 736.2 m3/second and the ACH that occurs is 155, this figure can be adjusted by setting how many openings to be opened or closed. The selection of the type of air outlet opening in the form of Horizontal Pivoted is based on needs.



inlet *Outlets*

Figure 3. Cassement Side Hung Type Inlet Design Recommendations and Horizontal Pivoted Type Outlets

The use of the recommended Inlet and Outlet is expected to turn the air circulation into optimal. Because air enters from the inlet which is at a lower elevation than the outlet and there is air turbulence which can be seen in Figure 4.25, the air exchange can be optimized.

Figure 3. Perspective Slice of Airflow in a Computer Laboratory

If the airflow is smooth Indoor Air Quality will have good quality, this will affect the productivity of room users and it is hoped that it can minimize the spread of Covid-19 in the computer laboratory room and face-to-face (offline) learning activities to feel safe and more comfortable.

Conclusion

Based on the results of the research data and discussion that has been presented, the following conclusions can be drawn:

1. The infrastructure of the DPIB computer laboratory room at Baleendah State Vocational School 7 has an area of 96 m² with an area ratio of 3 m² per student, and the capacity to accommodate 31 students. The facilities in the computer laboratory room have 32 computer desks in good condition, 32 student chairs in good condition, 1 teacher's desk in good condition, and 1 teacher's chair in good condition. The health protocol facilities at SMK Negeri 7 Baleendah have hand sanitizers, ready to implement the mandatory mask area, and study groups have been divided.
2. Based on the minimum standards of Permendikbud No. 34 of 2018 the DPIB program computer laboratory facilities and infrastructure at SMK Negeri 7 Baleendah have met the minimum standards with a percentage of 72.91% (decent) facilities and 83% infrastructure (very feasible).
3. Evaluation results for health protocol facilities based on standards in the guidebook for organizing learning during the Covid-19 pandemic, the availability of disinfectant liquid has not been fulfilled, hand washing soap is not available in the sink near the computer laboratory room, and the layout of the computer laboratory room has not been changed.
4. Design recommendations in the computer laboratory room where each seat is spaced at least 1.5 meters and the student's seating position is also not facing other students. Circulation in the computer laboratory room applies circular circulation. Place the handwashing area/sink next to the entrance. This is done so that in addition to making it easier for room users to reach the sink, it is hoped that it can reduce queues of passing each other. The inlet and outlet opening types are replaced with inlet types using casement side hung and outlets with horizontal pivoted types. Using the recommended Inlet and Outlet with this type is expected to turn the air circulation into optimal.

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