SOCIALIZATION OF THERMAL COMFORT STANDARDS AT SMKN 4 SOUTH TANGERANG

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ABSTRACT

Vocational High School (SMK) is a formal education unit that provides education that prepares students to work in specific fields. Students can continue their vocational education after completing their education at the junior high school level. SMK Negeri 4 South Tangerang is one of the 4th Vocational High Schools in the City of South Tangerang, specializing in Building Modeling and Information Design, Health Services, Animation, and Visual Communication Design. SMKN 4 South Tangerang is located on Jalan Sumatra-Tidore, Jombang Village, Ciputat District, South Tangerang City, Banten Province, with a land area of 4,562 m2. Currently, SMK Negeri 4 South Tangerang uses a natural air circulation system with openings in each class; then, each class uses a fan for artificial air circulation. There are four types of building comfort: thermal comfort, space comfort, and audio comfort. Space comfort is related to the comfort of movement space and relationships between spaces. Meanwhile, thermal comfort is an essential part of building comfort because room temperature influences the feeling of comfort. This is because every human being has sensors on their skin that work when there are hot or cold temperatures. Thermal comfort conditions that comply with standards will help the teaching and learning process be streamlined at SMK Negeri 4 South Tangerang. So that SMK Negeri 4 South Tangerang has thermal comfort that meets standards, Budi Luhur University organizes Community Service activities to socialize the achievement of thermal comfort at SMK Negeri 4 South Tangerang. The method of implementing activities uses the concept of Problem Solving. At the same time, the Problem-Solving concept uses input stages, problem-solving processes, and output. The aim of socializing the achievement of thermal comfort is so that the management of SMK Negeri 4 South Tangerang knows how to achieve thermal comfort standards so that students at the School are comfortable when carrying out the teaching process.

Keywords: Thermal comfort; SMKN 4 South Tangerang; natural air circulation; openings; fans

1. INTRODUCTION

Vocational High School (SMK) is a formal education unit that provides vocational education at the secondary education level, which prepares students primarily to work in specific fields. Students can continue their vocational education after completing education at the junior high school level or equivalent (Patel, 2019).

The study period for vocational school students is three to four years. Vocational schools implement a four-year study period, divided into three years of study at School and one year in the related industry (Siswoyo, 2013).

Education providers are divided into two, namely public and private. Several majors are usually attractive to prospective vocational school students, including the Departments of Multimedia, Animation, Administration, Accounting, Pharmacy, Tourism, Shipping, Mechanical Engineering, Catering, Electrical Engineering, and so on (Ministry of Education and Culture, 2018).

SMK Negeri 4 South Tangerang is one of the 4th Vocational High Schools within the South Tangerang City Government, with areas of expertise in Building Modeling and Information Design, Health Services, Animation, and Visual Communication Design. SMKN 4 South Tangerang is located on Jalan Sumatra-Tidore, Jombang Village, Ciputat District, South Tangerang City, Banten Province, with a land area of 4,562 m2 (Figure 1). This state vocational school started its educational activities in 2012. Currently, South Tangerang State Vocational School 4 uses the 2013 REV Vocational School curriculum related to Modeling Design and Building Information. SMKN 4 South Tangerang received Grade B accreditation status with a score of 90 (2019 accreditation) from BAN-S/M (National Accreditation Body) for Schools/Madrasah.

eISSN 2622-5611
DOI: 10.33068/iccd.v5i1.647

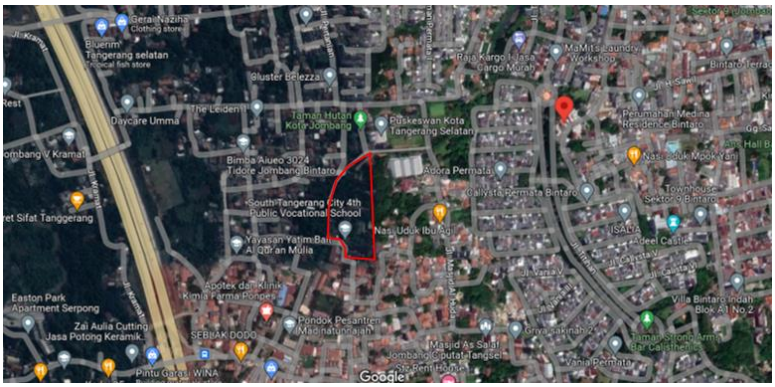

Figure 1. SMKN 4 Tangerang Selatan Location

Source: https://s.id/1NCLa diakses tanggal 24 Juni 2023 jam 11.39 WIB

The vision of SMK Negeri 4 South Tangerang is to produce graduates who have a likable character, are healthy, independent, superior, creative, care about the environment, and have a global perspective (Smkn 4 South Tangerang, 2023).

Meanwhile, the mission of SMK Negeri 4 South Tangerang is (SMKN 4 South Tangerang, 2023):

1. Providing educational services and religious activities to increase piety and noble morals
2. Educate students in the areas of skills, knowledge, and character development as well as environmental preservation by their expertise program.
3. Preparing students who can collaborate in the world of work and global diversity
4. Creating students who have an entrepreneurial spirit can continue their education to a higher level and have competitiveness at the global level.
5. Increasing the role of vocational schools as centers for skill development, a culture of healthy living, and an environmental perspective
6. SMK Negeri 4 South Tangerang has 26 theoretical workshop classrooms for each department as well as 1 library room, which is equipped with 2 sanitation rooms for teachers and 2 sanitation rooms for students (SMK Negeri 4 Kota Tangerang, 2023).

Figure 2. Gate's School of SMK Negeri 4 Tangerang Selatan

Source: https://www.smkn4tangsel.sch.id/ accessed 24 June 2023; 14.28 WIB

Figure 3. Court's School of SMK Negeri 4 Tangerang Selatan

Source: http://www.smkn4tangsel.sch.id/ accessed 24 June 2023; 14.34 WIB

Figure 4. Building of SMK Negeri 4 Tangerang Selatan

Source: http://www.smkn4tangsel.sch.id/ accessed 24 June 2023; 14.34 WIB

Figure 5. Open Space at SMK Negeri 4 Tangerang Selatan

Source: http://www.smkn4tangsel.sch.id/ accessed 24 June 2023; 14.34 WIB

Figure 6. Classroom at SMK Negeri 4 Tangerang Selatan

Source: https://smarteschool.id/berita/tim-smart-e-school-melakukan-training-pas-di-smkn-4-tangerang-selatan/ diakses tanggal 24 Juni 2023 jam 14.36 WIB

Gambar 7. Main Classroom at SMK Negeri 4 Tangerang Selatan

Source: https://smarteschool.id/berita/training-aplikasi-smart-e-school-bersama-smkn-4-tangerang-selatan diakses tanggal 24 Juni 2023 jam 14.38 WIB

Classrooms are public facilities used for learning activities. Therefore, the building must meet the comfort and strength standards required in the Minister of National Education Regulation Number 24 of 2007 concerning Facilities and Infrastructure Standards for SD/MI, SMP/MTs, and SMA/MA. To meet the comfort and safety standards as regulated in the Minister of National Education Regulation, the rehabilitation/construction process for classrooms must meet the standards and specifications set out in the tender documents, both in the form of best-of-class drawings and technical specifications. The standard for classroom rehabilitation is that the size of the room is adjusted to the size of the classroom to be rehabilitated, the room ceiling height is at least 3.50 meters from the floor, and the slope of the roof depends on the type of roof covering used (Kebudayaan, 2007).

To achieve these needs, school facilities and infrastructure must meet comfort standards. Building comfort consists of four aspects, namely thermal comfort, space comfort, audio comfort, and visual comfort. The comfort of relationships between spaces and the comfort of movement space generally influence the comfort aspect of space. A critical aspect of building comfort is thermal comfort; this is related to the air temperature that is felt to be comfortable. Humans have taste sensors

found on their skin when they experience hot or cold temperature stimuli in their surroundings. Thermal comfort conditions that comply with standards will help the teaching and learning process run smoothly at SMK Negeri 4 South Tangerang.

So that SMK Negeri 4 South Tangerang can meet thermal comfort standards, Budi Luhur University will provide knowledge to school students on how to achieve thermal comfort standards through Community Service activities with the theme "Socialization of Achieving Thermal Comfort at SMK Negeri 4 South Tangerang".

2. METHODS

The problem of thermal comfort at SMK Negeri 4 South Tangerang is to provide socialization to school students on how to achieve thermal comfort standards to help provide thermal comfort for students during the teaching and learning process at school. Socialization of Achieving Thermal Comfort at SMK Negeri 4 South Tangerang using the Problem-Solving Method as in Figure 8.

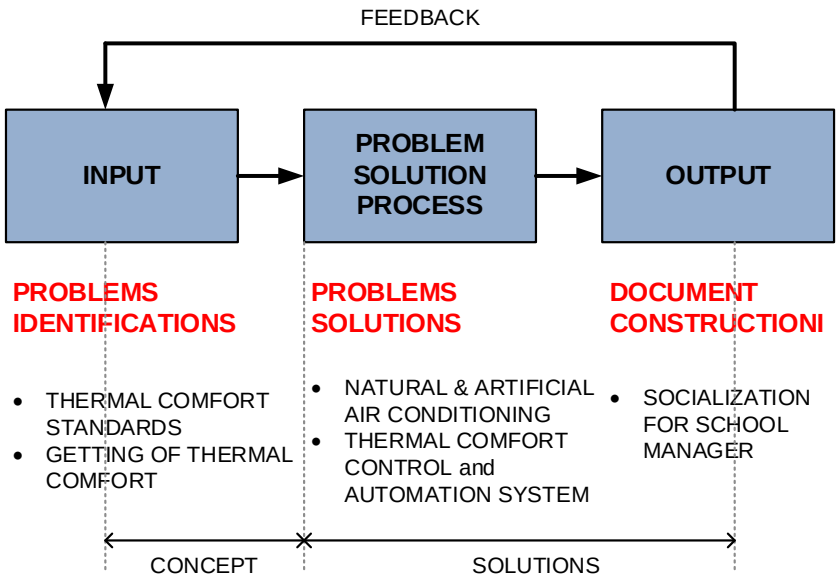

Figure 8. Problem-Solving Methods

At the Input stage, the problems at SMK Negeri 4 South Tangerang were studied. The problem is the need for school students' knowledge about thermal comfort standards and how to achieve these thermal comfort standards.

At the Problem Solving Process stage, thermal comfort standards, including air temperature, air humidity, and wind speed, are studied. Also studied are artificial and natural air conditioning systems in buildings. Apart from that, indoor air conditioning control and automation systems were also studied.

At the Output stage, the material was created for the Socialization of Achieving Thermal Comfort at SMK Negeri 4 South Tangerang.

Stages of implementing the Socialization of Achieving Thermal Comfort at SMK Negeri 4 South Tangerang by the Problem-Solving Method as in Figure 9

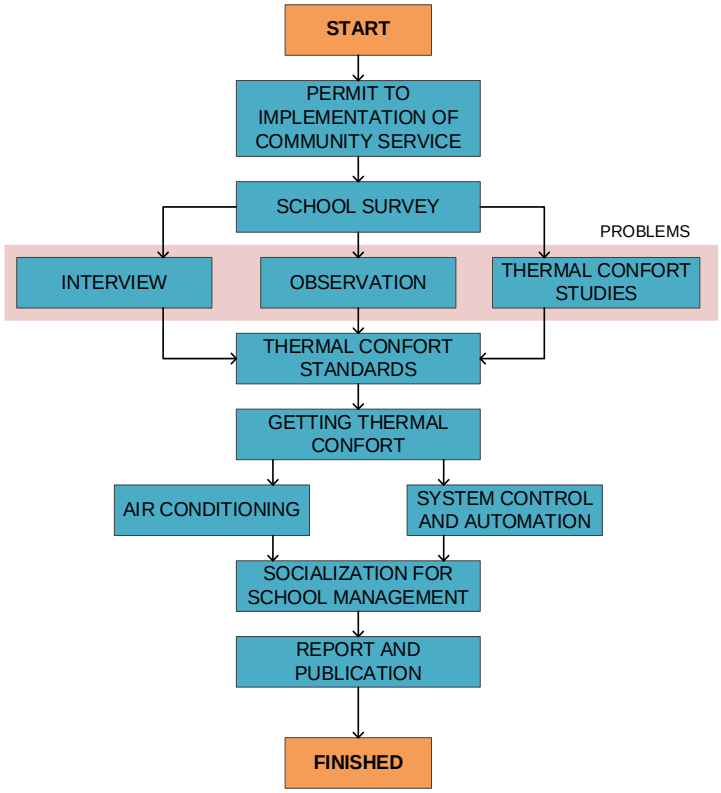

Figure 9. Implementation of Outreach

The solution to the problem of achieving thermal comfort standards at SMK Negeri 4 South Tangerang is to provide outreach to school students about thermal comfort standards in buildings, as in Figure 10.

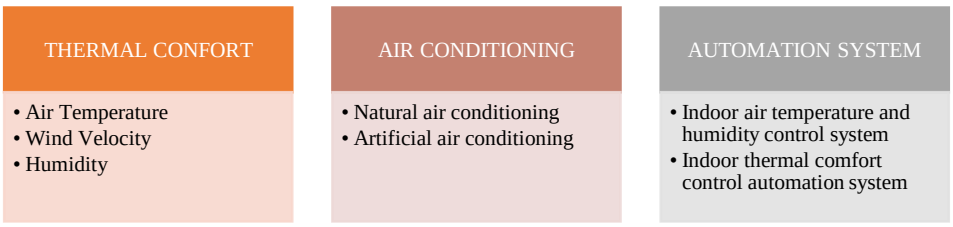

Figure10. Socialization Solutions to Achieving Thermal Comfort at SMKN 4 Tangerang Selatan

3. RESULT AND DISCUSSION

Implementation of the Socialization activities for Achieving Thermal Comfort at SMK Negeri 4 South Tangerang is:

Agenda

1.	Agenda Name	:	Universitas Budi Luhur Community Development Program
2.	Agenda Title	:	Socialization of Achieving Thermal Comfort at SMK Negeri 4 Tangerang
3.	Agenda Theme	:	Achievement of Thermal Comfort Standards

Implementation

1.	Name of Agenda	:	Fakultas Teknik & Fakultas Teknologi Informasi Universitas Budi Luhur
2.	Address	:	Jl. Raya Ciledug, Petukangan Utara, Jakarta Selatan
3.	Team Leader	:	Anggraeni Dyah Sulistiowati, S.T., M.T
4.	Team from Lecturer	:	Harfa Iskandaria, S.T., M.T Lestari Margatama, S.Kom., M.Kom
5.	Team from students	:	• Jasmine Fatima • Dwi Ardyanto

Beneficiary Partners

1.	Name	:	SMK Negeri 4 Tangerang Selatan
2.	Address	:	Jalan Sumatra-Tidore, Kelurahan Jombang, Kecamatan Ciputat, Kota Tangerang Selatan, Provinsi Banten
3.	Principal	:	Angen Sumijati
4.	Participant	:	kelas X dan XI Student

Date and time of Activities

1.	Date/ day	:	Friday, 23 June 2023
2.	Waktu	:	01.00-03.00 PM WIB
3.	Tempat	:	Classroom

Table 1. Activity Schedule

No	Waktu	Kegiatan	PIC
1	13.00-13.30	Prepare	Tim PPM
2	13.30-13.35	Opening by the MC	Ibu Tari
3	13.35-14.05	PPM Material "Achievement of Thermal Comfort Standards"	Ibu Anggraeni
4	14.05-14.30	PPM material "Operational Thermal Comfort Measuring Instruments"	Bapak Harfa
5	14.30-14.55	Discussion session	Tim PPM
6	14.55-15.00	Closing oleh MC	Ibu Tari
7	15.00	Humidity Meter Handover	Tim PPM

Implementation of the Socialization of Achievement of Thermal Comfort activities at SMK Negeri 4 South Tangerang is divided into 3 main activities, namely delivering material on achieving thermal comfort standards, delivering operational thermal comfort measuring instruments, and discussions.

The activity began with an opening by MC Mrs. Lestari Margatama. This was then continued with the First Activity, material on Achieving Thermal Comfort Standards (figure 11). This first activity was delivered by Mrs. Anggraeni Dyah S. The material provided was:

- Thermal comfort is influenced by environmental factors consisting of air temperature, solar radiation, air humidity, wind speed
- Thermal comfort is influenced by individual factors consisting of the activities carried out, and the clothing used
- Artificial conditioning consisting of fans, exhaust/exhaust fans, and air conditioners

- Natural conditioning system through openings

Figure 11. First Material presentation activity

After the presentation of the second material was completed, the activity continued with the Third Activity, namely the discussion session (Figure 13). MC Mrs. Lestari Margatama guided the activity. The results of the discussion are:

1.	Student	:	If my bedroom has windows inside the house, and none of my bedroom walls are adjacent to outside space, how do I implement natural air circulation in my bedroom?
	Community Development Team	:	You can install an exhaust fan on the ceiling where the position crosses the opening position, which could be a door or window. When the exhaust fan is turned on, the door or window must be open to maximize the cross-air circulation system.
	Student	:	Why does the exhaust fan have to be placed on the ceiling? Why not just put it on the wall?
	Community Development Team	:	Because all the walls are adjacent to the inner room, then the hot air that is sucked in will only be moved to another room. If it is installed on the ceiling, it will be sucked into the ceiling and will come out through the air circulation in the ceiling.
2.	Student	:	Can we combine natural air conditioning and artificial air conditioning? If so, does it have any effect?
	Community Development Team	:	We can combine natural air conditioning and artificial air conditioning. For example, using an AC with a fan. There is a difference. For example, you can experiment with entering a room and then turning on the AC. Calculate how long it takes until our body feels the air around us is cooler. Compare this with entering the room and turning on the AC and fan simultaneously. The body will feel the surrounding air cool more quickly than without a fan.
	Student	:	What causes our bodies to feel the surrounding air cool more quickly when using an AC and a fan simultaneously?
	Community Development Team	:	Because the fan helps the hot air released by our body to leave the room
3.	Student	:	If I want to put a Humidity Meter in my bedroom, where is the most appropriate location?
	Community Development Team	:	It can be placed on the table in any position. But it is better to place it hanging in the middle of the room in a position according to our body height.

Figure 13. Focus Group Discussion with the Students

After the third session, the activity continued with a closing by the MC, Mrs. Lestari Margatama. After the event, a discussion was held, and the Humidity Meter equipment was handed over to school administrators (Figure 14).

Figure 14. Focus Group Discussion with the Principal and Teachers

The output from Community Service activities entitled Socialization of Achieving Thermal Comfort at SMK Negeri 4 South Tangerang is that students at SMK 4 South Tangerang know how to achieve thermal comfort standards in space, primarily through natural air conditioning. The SMK 4 South Tangerang school was given 10 Humidity Meters, which can be used to measure classroom thermal comfort.

4. CONCLUSION

Vocational High School (SMK) is a formal education unit that provides vocational education at the secondary education level as a continuation of SMP, MTs, or other equivalent forms. Vocational School is formal education that provides vocational education at the high school level. This School aims to prepare students to enter the workforce. The portion of the material above also explains why graduates' work skills are more adequate than those of high school graduates.

A comfortable and comfortable learning environment will significantly influence student learning success. Because when they feel comfortable and safe, students can focus more on receiving lessons. One of the comforts in buildings is thermal comfort. Thermal comfort is a condition where, psychologically, physiologically, and in behavioral patterns, a person feels comfortable carrying out activities at a specific temperature in an environment, which means the air temperature is not too hot or not too cold.

So that students can study thermally comfortably, schools need to provide classrooms with natural and artificial air conditioning. Artificial air conditioning can be done by providing AC or fan facilities. Natural air conditioning creates cross-air circulation in the room through appropriate openings. School administrators and students can condition classroom thermal comfort using available facilities and control it using a humidity meter.

5. REFERENCES

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