Interior design study of lecturer rooms at E12 building 2\textsuperscript{nd} floor UNNES – learn from COVID-19 pandemic

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Abstract. The covid-19 pandemic case has changed the structure of life in all aspects throughout the world. The field of man-made environment or architecture is no exception. The interior arrangement of a building, as part of the man-made environment, is also affected. The interior design of a building today seems to be obliged to participate in following the standards of new health-protocols in the new normal era. What about the interior of the building that has already been utilized? Of course it requires further study to find out whether the interior of a building can be said to be healthy or not. This study aims to examine the interior design of the lecturer room E12 building 2\textsuperscript{nd} floor UNNES in terms of health that is emphasized from the behavior of its users by referring to the situation of the covid-19 pandemic and its future prospects. The research method used is by field observations to search visual data, observing user behavior and textual data. Those who are categorized as users of the lecturer room E12 building 2\textsuperscript{nd} floor UNNES are lecturers from the Department of Architecture, students, administrators and guests. The results of this study indicate that based on the pattern of user behavior and associated with the standard requirements of space, area, volume of space, material and infrastructure conditions, interior design of lecturer room E12 building 2\textsuperscript{nd} floor UNNES, is included in healthy category, although there are several minor corrections that can be included as suggestions for improvement in order to adjust to the new normal era during the covid-19 pandemic period and thereafter.

1. Introduction

Better adaption must be considered in the building services of high occupancy due to the urgency to facilitate the reduction of disease transmission resulting from inappropriate or inadequate ventilation. Many of the current ventilation strategies that rely on centralised air distribution and ceiling level supply or recirculation can provide the optimum conditions for rapid disease spread in high occupancy buildings. On the other hand, displacement ventilation strategies, such as the natural ventilation or naturally assisted ventilation explored above, can provide an effective starting point for reclaiming our buildings for safe use [1]. As pandemic response protocols are being developed on university campuses, student foot traffic within academic buildings is one of many factors to consider. The analysis indicates that minimizing the time spent in passing between classes is the driving factor in minimizing risk, and one-way traffic may increase the time required to pass between classes [2].
Enacting enhanced building HVAC operational practices can also reduce the potential for spread of SARS-CoV-2. Viruses are frequently found associated with larger particles (e.g., complexes with water, proteins, salts, etc.) in a range of sizes. Even though some of these particles have been identified in sizes that could potentially penetrate high efficiency filters, ventilation and filtration remain important in reducing the transmission potential of SARS-CoV-2. Proper filter installation and maintenance can help reduce the risk of airborne transmission [3].

1.1. Overview of Human Behavior in Architecture

Architectural design is inseparable from human behavior as its constituents and human relationships with their physical environment. Behavioral architecture is an architecture whose application always includes behavioral considerations in design. This phenomenon refers to personal behavior patterns, which are related to the existing physical environment, related to human interpersonal behavior or human social behavior. Behavior is the action or activity of the human being himself which has a very wide range of bugs, including: walking, talking, crying, laughing, working, lecturing, writing, reading, and so on. From this description, it can be stated that human behavior is all human activities or activities, both those that are directly observed and those that cannot be observed by outsiders. Behavior is a person's response or reaction to external stimuli. Because of the behavior that occurs through a stimulus process towards the organism, and then the organism responds, Skinner's theory is then called the "S-O-R" theory or Stimulus - Organism – Response [4].

1.2. Theories about Behavior Architecture

People and their behavior are part of a whole system that includes place and environment, such that behavior and environment cannot be empirically separated [5]. That is to say, human behavior always happen in a place and they cannot be fully evaluated without considering the environmental influence.” From this theory several important points can be drawn including: 1. the environment that influences human behavior. Example: People tend to occupy a place that is usually occupied even though the place is not a seat. For example: the arrangement of stairs in front of the house, large car trunk, low fence and so on. 2. Human behavior that affects the environment. Example: When people tend to choose a shortcut that they think is the closest to passing a pedestrian that turns. So that person has unwittingly made their own path despite pedestrian is provided.

According to Winston Churchill. Human behavior is understood as forming architecture, but architecture can shape human behavior as well. Winston Churchill once said in 1943: "We shape our buildings, then they shape us". Humans build buildings to meet their own needs, and then the building shapes the behavior of humans who live in these buildings. Buildings designed by humans that were originally built to meet human needs eventually affect the way that humans live their social lives and values in life. The Pandemic COVID-19 period has now completely changed the way humans look at the meaning of health in all aspects, both in terms of behavior and in the field of interior structuring. In behaving indoors, one important issue is the distance between individuals. From the previously very loose boundaries, now after a pandemic, people must keep their distance from each other.

Behavioral-oriented architecture is a humane architecture, which is able to understand and accommodate human behaviors that are captured from a variety of behaviors, be it the behavior of the creator, the user, and the observer as well as the behavior of the natural surroundings. It was stated that architecture is the creation of atmosphere, marriage of use and image. To refer to the benefits arising from the design results. These benefits are obtained from the physical arrangement of the building in accordance with its function. However, use does not only mean benefits, but also produces a power that causes the quality of our lives to increase. Image refers to the image displayed by an architectural work. Imagery is more spiritual because it can only be felt by our souls. The image is a symbol that expresses all that is human, beautiful and great from the creator [6].

There are four distance zones in communication. • Intimate distance, which starts from 0.00 - 0.50 m. Distance for embracing lovers, friends or family members. • Personal distance is 0.50 - 1.20 m. Distance for conversation between two friends or between people who are already familiar with each
other. • Social distance is 1.20 - 3.60 m. Is a normal limit for individuals with similar activities or the same social group. • Public distance is 3.60 m to more than 7.50 m. A distance not used in interactions between two individuals, but in a conversation between one person and thirty or more people [7].

1.3. Standards of Healthy Room

1.3.1. Space
Space is everything that includes land space, sea space, and air space, including space in the earth, as a place where humans and other creatures live, carry out activities, and maintain its survival. In this case the definition of space covers a very wide area. The examples of micro spaces are study rooms, dining rooms and also office spaces [8].

1.3.2. Office Space.
Office space layout is the arrangement of furniture and equipment on the available floor area deemed necessary for the implementation of office work at a reasonable cost [9]. A good office spatial arrangement can make a better employee movement system so that it is expected to achieve efficiency at work. Good office conditions or atmosphere is intended to get comfort and support the smooth working effectiveness of employees. Here is a standard office floor plan from Neufert [10]:

![Figure 1. Office Spatial Arrangement](image1)

Figure 1. Office Spatial Arrangement

![Figure 2. Minimum size of office space](image2)

Figure 2. Minimum size of office space

1.3.3. Building Health Requirements.
Building health requirements include requirements for ventilation, lighting, sanitation and the use of building materials. The building comfort requirements include the comfort of circulation space and the relationship between spaces, thermal comfort in space, comfort of view, comfort of vibration and noise levels. The fulfillment of these requirements aims to protect users from health problems and performance degradation due to the shape and location of the space and interior design. Efforts to make spatial planning in general according to the Regulation of the Minister of Health of the Republic of Indonesia NO.1077 / MENKES / PER / V / 2011 are all efforts to improve the quality of air in the space and prevent the decline in air quality in the room [11]. Efforts to improve the space include: 1. Clean the air conditioner at least 3 or 6 months 2. Clean and dry wet or damp carpet. 3. If you want to use the basement as one of the rooms, make sure there are no leaks and the room has a good ventilation system. 4. Equipped with ventilation. 5. Using air conditioning (air conditioning) and
humidity control to maintain moderate temperatures (not too hot or cold) and reduce the level of humidity. 6. Make sure the materials containing asbestos are in good condition, check regularly and replace building materials before they are damaged.

2. Methods
The research method used is by field observations to search visual data, observing user behavior and textual data. Those who are categorized as users of the lecturer room E12 building 2nd floor UNNES are lecturers from the Department of Architecture, students, educators and guests.

3. Results and Discussion

3.1. Results
The research location is Lecturer Room of Architecture Study Program, 2nd Floor, E12 Building, UNNES Sekaran, Semarang. The data obtained are as follows:

3.1.1. Plan and Section of Lecturer Room E12 Building.

![Figure 3. Plan of lecturer room E12](image)

![Figure 4. Section of lecture room E12](image)

3.1.2. Room Dimension.
Lecturer Room E12 building has a total area of 116.10 m², consisting of 10 lecturer work spaces with a length of 3.04m and a width of 2.4m, a hallway with a width of 1.38m and a length of 16.54m, a waiting room in the middle of the room measuring 13.8m² with a width of 4.54m and a length of 3.04m. The partition wall in the lecturer room which is insulated between rooms has a height of 2.1m following the height of the door in the room. While the ceiling height in the room is 3m. Each lecturer workspace has a door of 0.8m x 2.1m and four windows of 1m x 0.8m the distance between the window and the floor is 1m. Each partition wall is made from gypsum board. Partition walls adjacent to the aisle are transparent walls made from glass.
3.1.3. Lobby and Hallway.
The 2nd floor of the E12 building has two passageways separated by a corridor right in front of the lecturer hall. The north hallway has two different widths of 2.45m and 2.8m with an overall length of 11.2m. The southern passageway has a length of 6.35m and width reaches 2.6m. While the hallway has a length of 16.65 m and a width of 4.85m. The hall in this building is usually used by students and lecturers as a place for task assistance outside of lecturing hours; this place is provided with chairs and tables to facilitate these activities. Also provided are several sets of waiting chairs. The east wall of the corridor is a transparent wall consisting of several dead windows and a few window sills that are left perforated or not given glass to serve as a place for the entry and exit of winds from outside the building into the hallway.

3.1.4. Lecturer and Student’s Toilet.
The lecturer toilet is on the north of the lecturer room. Consists of 2 toilet units measuring 2m x 1.7m, and a sink space measuring 1.45m x 3.4m. While the toilet for students consists of 2 different rooms for women and men, this toilet is located in the south of the lecturer room. Each toilet has 2 wc units with a size of 1.45m x 2m.
3.2. Discussion
Lecturer Rooms E12 are rooms provided for the lecturers of Architecture Study Program which is equipped with a guest table and chairs for each lecturer. The E12 lecturer room is also useful for making it easier for students to interact and discuss directly with the lecturers. Following is an analysis of the data on the influence of E12's lecturer room on aspects of health both mental and physical.
3.2.1. **Circulation**

Circulation space in the front hall of the lecturer room is sufficient and appropriate to the standard. The entrance which is placed in the middle and the organization of space is enough to facilitate access for users. However, for students who want to conduct the assistance, it is not advisable to queue to meet with the supervisor in the lecturer room because it will hamper circulation in a quite small space, with the addition of 3D ornaments, and is not a public zone. Nevertheless, students can still wait in line for assistance with the supervisor in the waiting room that has been provided in the front hall of the lecturer room. In relation to architectural behavior, a large lobby area coupled with the placement of tables and chairs is enough to explain to users that the area is a communal area that can be used as a waiting room and discussion room.

![Figure 10. Circulation in lecturer room](image)

![Figure 11. Overall circulation and the lobby](image)

3.2.2. **Natural Lighting**

Natural lighting for the front lobby of the lecturer room is sufficient to provide lighting in the room during the day. But for the inside of the lecturer rooms and the bathroom it is still needed additional artificial lighting from the lamp so that the room can function optimally.
3.2.3. Natural Ventilation.
Aluminium windows are available in each lecturer room. With a window design composed of 3 parts, namely the lowest order window is the bottom opening window, like a window in general. Above it there is a glass window (patent), plus a trellis window at the very top. Each room is given 2 windows. But at the lobby, there is a glass grid, with a variety of mixed colors. Maybe it can add the aesthetic impression. But the effect is the air cannot freely enter, the air must find an empty grid gap without glass, and some other air spread to the opening of the glass grid side. In the western part of the lecturer room, the air is good enough, because the opening on the west side is wide and effective for air entry. This condition is very possible for cross ventilation. In addition to saving power, natural air is believed to be healthier than using electronic devices (air conditioners). During the pandemic good air circulation is needed, so viruses, germs, bacteria, and pathogens cannot grow easily. The large number of cross ventilation can protect lecturer room users from the spread of disease.

3.2.4. Air Conditioner
Lecturer room e12 building does not use air conditioner. The positive side of not installing air conditioning is reducing the electricity cost of the building, reducing the potential for drying the skin and hair of space users. A study of Lu et al. [12] stated that AC has a role in the spread of the SARS-COVID-19 virus. The direction of air flow from the AC is consistent with the transmission of droplets
that come out of people infected with COVID-19. The absence of air conditioning in the lecturer room E12 helps to reduce the spread of COVID-19.

3.2.5. Guest Room.
The size of the living room is quite small and a bit claustrophobic so it's a bit uncomfortable if there are guests. The lecturer room chairs can only accommodate 4-5 people. The guest waiting room in the lecturer room which is quite crowded can increase the risk of COVID-19 distribution. The guest waiting room adjacent to the pantry is also often used by lecturers as a communal room for discussions while enjoying the coffee that is served. In addition, student behavior usually tends to occupy lecturers' living rooms and jostle without regard to safe distance to queue for assistance turns.

![Figure 14. Guest room](image1)

3.2.6. Arrangement of Lobby Benches.
The arrangement of benches in the waiting room for students is already good, namely with a parallel arrangement. Students can interact with each other while waiting for the lecturer so they don't experience boredom.

![Figure 15. Lobby benches and chairs](image2)

3.2.7. Healthy Distance Amongst Lecturers and lecturer-student Interaction.
The size and shape of the lecturer space allows for the creation of a healthy social distance amongst lecturers and lecturer-students, particularly at this pandemic era. In this social distance (1.22 – 3.66m) people can still communicate normally without shouting, yet quite save.

![Figure 16. Dimension of each booth of lecturer room](image3)
4. Conclusion and Suggestion

4.1. Conclusion

Based on the analysis, it was concluded that the E12 lecturer room was healthy enough. The lecturer room already has adequate circulation. There is also cross ventilation in the lecturer rooms. If referring to the healthy distance that occurs in this pandemic, the interaction amongst the lecturers has fulfilled the healthy distance, let alone with the existence of a partition between lecturers. The interaction between lecturers and students has made it possible for a healthy distance, because the distance between lecturers and students is in accordance with the recommended minimum distance (social distance). Each room in the lecturer room also has a capacity of two people. However, natural lighting in the lecturer room is not enough to provide lighting in the room during the day although there are openings in the form of windows on both sides of the room, front and rear. In addition, natural ventilation cannot reach all space. The absence of air conditioning makes it difficult to maintain moderate temperatures, but it is quite helpful in inhibiting the spread of the COVID-19 virus. The bench for students in the lobby is complete and the arrangement is good.

4.2. Suggestion

The interior design of a building today seems to be obliged to participate in following the standards of new health-protocols in the new normal era. For the lecturer rooms in E12 2nd floor, the things that can be done in order to adapt to the new normal and new protocol are as follows: The living room should be used by 50% of the normal number of users. So that usually can accommodate 4-5 people, to prevent the spread of COVID-19 can only be used with a capacity of 2 people. During the COVID-19 pandemic, people were encouraged to keep their distance. In the student waiting room, chairs need to be rearranged by giving a minimum distance of one meter or emptying two benches. It can be done by crossing the bench that is spaced to emphasize that the bench is forbidden to be occupied. In addition, it is necessary to limit the working hours and limit direct interaction amongst lecturers as well as lecturer with students. To increase the safe interaction between lecturers and students, it is necessary to add plastic or acrylic glass separator and the availability of hand sanitizers at each lecturer desk. So that it can change the habits of student behavior to maintain cleanliness by always washing hands or using a hand sanitizer.

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