Adaptation to study environmental challenges: COVID-19 and new norms

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Abstract. This study defines the atmosphere of architecture students studying at home using ergonomic space in the house as a learning space during the covid-19 pandemic. Since the Movement Control Order (MCO) in March 2020, all public universities in Malaysia have made it mandatory for their students to study from home (SFH). The students have different study environments depending on their family economic background. Focussing on architecture students who are involved in designing works, they need a studio-like setting to place drafting materials and tools, computer or laptop and study and create furniture. This conducive studio setting is a crucial component in completing good architectural works within the given time frame. In response to SFH, this research explores students' perceptions and experiences on their home ergonomic environments and their expectations for a better home study environment. The research applied a quantitative method where sample respondents are among new Architecture degree students of UiTM Perak Branch. The Questionnaires were distributed by email to all 400 potential respondents in the first semester, and 112 respondents completed the form within a given time. In general, results have found that respondents have mixed feelings about their perception of challenges SFH.

1. Introduction
Studies have shown that study from home (SFH) has affected students' performance, especially design-based students, including architecture students, due to an unconducive home environment. A previous study found that a working environment with an appropriate ergonomics workspace is essential in influencing students' performance and improving the thinking process during academic sessions [1]-[2]-[3]. Ergonomic workspace in this research refers to the design and arrangement of tools and furniture where students feel comfortable and can easily reach them whenever they need. Students with good ergonomics workspace are expected to increase efficiency and reduce working time to produce design tasks [4]. In addition, ergonomic workspace provides a conducive environment for students to develop their ideas, creativity and sense, and turn them into high-quality design outcomes [5]-[6].
Apart from the ergonomic workspace, architecture students also need ergonomic furniture such as tables and chairs to design works. Since different students have different body sizes, it is advisable to use adjustable desks and chairs[7]. Students can adjust this furniture up to individual comfortless and avoid unnecessary body aches. High-quality adjustable tables and chairs typically offer a better comfort level, but it comes with a price. Previous findings show that one of the significant factors to improve ergonomic workplace is modifying or adjusting seating position with appropriate height and angle[8]. A study on the configuration dimensions with the best ergonomic efficiency in the workstation stated three varied parameters: scope distance, scope height, and chair height[9]-[10].

2. Data analysis and findings
This study employed a mixed-method approach where data was collected using questionnaire surveys and a case study on the home specification environment of one student. The following explains the details of surveys, analysis and findings.

2.1. Analysis and findings from questionnaire survey
The sample respondents were from the 1st-semester architecture students enrolled in the UiTM Perak branch in March 2021. The total number of these new students is about 400. The questionnaire consists of seven open-ended questions concerning students' experience and perception with their workspace and furniture during SFH. The variables included in the questionnaire are the number of family members, type of residence, space layout of the living, number of workdays in a week, home space utilised for workspace, comfortless workspace, furniture preferences, and preferred workspace. These questionnaires were distributed through email to all potential respondents using google Forms.
Likely respondents were given five (5) working days to complete the survey form, and by the end of the given period, this research managed to obtain 112 sample respondents. Data collected through open-ended questionnaires were analysed and coded accordingly and keyed into SPSS for analysis. This research applied descriptive analysis to answer the research aim.

Analysis has found that there were six (6) types of residence of respondents. Results show that 92% of respondents live in modern houses, namely bungalows, terraces, semi-detached, apartment and condominium, and only 8% live in traditional houses (Figure 3). The shows that the majority of students have a considerably good standard of living. The respondents' size ranges from 1000 to 700 square feet, and all respondents have three (3) bedrooms (Figure 4). In addition, close to 54% of respondents have six and more household members (Figure 5). This figure shows that most respondents have less space for studying to share with other family members.

Respondents were also asked how many days they spend a week on SFH activities. Again, the number of days paid for SFH varies between respondents. Close to 50% of respondents spent 5 to 7 days a week, and only 22.3% spent two days and below (Figure 6). However, 48% of respondents who spent two days below SFH had an enormous household size (Figure 7). This figure shows that to a certain extent, the number of households might influence motivation to study.
When studying at home, students are free to choose their favourite available space for SFH activity. This research found that 63.4% of respondents preferred to conduct SFH in the bedroom while 2.7% in the kitchen and 0.9% had no specific space (Figure 8). Bedrooms have become the most preferred because they offer better privacy compared to other places. In terms of comfortless, respondents have mixed feelings (Figure 9). 39.3% of respondents feel comfortable with SFH, 38.4% moderate and 22.3% uncomfortable.

With regards to the importance of elements during SFH, respondents highlighted three (3) components, namely privacy (70.6%), table (22.3%), chair (3.6%) and 3.6% of respondents are not sure (Figure 10). That indicates that most respondents would like to have privacy to stay focused on completing their design work. Therefore, they need to allocate space to place a drafting table, computer table, chair and drawing tools with reasonable privacy. Thus, privacy is one of the essential elements to achieve ergonomics at home.

In addition, respondents also asked if they were allowed to upgrade their workspace for SFH, which space they preferred most (Figure 11). Most respondents hoped to upgrade their bedroom (40.2%) and study room (30.4%). The upgraded workspace would be enough to place all necessary furniture, tools and materials for design works.
2.2. Analysis and findings from a case study

In addition to questionnaire surveys, this research also uses a case study on one of the respondents who volunteered, identified as Mr X. This is to understand further the closed-up layout and detailed furniture in the workspace of a sampled respondent. This case study explains how architecture students usually play around with the available space at home for SFH. Mr X lives in a two-storey semi-detached house located in Kajang, Selangor. There are four family members in the place, his parents and a younger brother. Mr X and his brother are both involved in SFH, and their parents have allocated space for each of them to study. Mr X is given a 4.5m x 3m (approx. 15’ x 10’) room with a well-ventilated window, enough daylight, and an air-conditioning unit for the workspace. The respondent volunteered to provide the sketches with measurements of his workspace, as shown in Figures 10 and 11.

The workspace of Mr X contains two study tables, a Japanese table and a study table, a chair, two bookshelves, and a two-seater sofa (Figure 10). Somebody can consider the room size and furniture arrangement, and three people can utilise this room at a time (Figure 11). The placement of furniture is seen as appropriate for design works and provides a conducive and comfortable environment. According to Mr X, the arrangement furniture was made by himself, and he enjoys and feels good working and studying in his room during the SFH session. Good furniture arrangement offers ergonomic space where fits individual body size and posture to moving around within the room space to reach tools and materials for design work. The comfort level of the workspace is highly related to the arrangement of the furniture in the room[13].

Apart from furniture arrangement, the size and design of each piece of furniture are equally essential to help increase the conduciveness of the workspace. For example, regarding Mr X's
workspace, this furniture was as acceptable for the everyday use of reading and writing. However, for an architecture student who involves long hours of designing work, appropriate furniture will help students feel more comfortable. Furthermore, working on a design project requires consistent body movement, such as standing and sitting while drawing and product modelling. Thus, adjustable furniture, especially chairs and tables with suitable sizes, will help fit individual body posture and provide comfort less [14].

3. Recommendation and conclusion

Overall, the architecture students have a different atmosphere studying at home based on ergonomic learning space during the covid-19 pandemic. Some students are lucky enough to have all necessary furniture, tools and materials placed in an allocated workspace. However, some students with financial constraints have no choice but to settle with whatever is available in the house. Of course, it will create inconsistency or a gap of home environment among all students, reflecting the quality of their design output. This gap is usually solved where the university provides a specific architecture studio with all necessary furniture and equipment. To minimise circulation students' from workspace have a gap between other students, it is a recommended that lecturers offer simple tips to especially new architecture students. For instance, one good piece of advice is to arrange the home furniture to obtain maximum ergonomic workspace with no or minimum budget. It will focus on the positioning of existing furniture and equipment within the available spaces [4].

According to the household living at home, respondents facing the situation are crowded with family members, and the respondents find it challenging to find space for making models or drawing. For Spaces Commonly Used for Study from Home (SFH), respondents are more comfortable doing their architecture work in the bedroom, which is more private and accessible without interrupting other people. The other aspect is furniture at home which the respondents need personal space and adjustable for them to make drawing and ergonomics at home. In conclusion, this study would help ensure ergonomic space for students in doing their drawings and models during Study From Home (SFH). Further research with different methods, target groups, and larger samples are recommended to achieve more findings. In addition, if students have a meagre budget, advise them to spend on a good chair with adjustable specifications because research found that chairs significantly contribute to the level of comfort less [7]. Adjustable chairs can be set to an individual's desired body posture and hence gain maximum comfort.

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