A New Workshop Hub Design for University in The Post-Pandemic period

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Abstract. It turns out that Covid-19 has not only affected our health, but also influenced our surrounding areas where we live, work or study. Nowadays, in the post-pandemic era, universities reopen instead of taking virtual teaching, keeping social distance is still of great importance. This essay aims to design a new place for students and academics to study, with a priority of their safety in the post-pandemic campus. Engineering Building of Xi'an Jiaotong Liverpool University and the Benzie Building of Manchester Metropolitan University have been selected as case study since they have a similar building use and made different changes after Covid-19 breaking out. To collect enough information before making a design proposal, a number of interviews and questionnaires have been individually taken place in two buildings. By analysing results from research, good design will be considered into our final design while shortages will be improved. Our design will be based on Engineering building in Xi'an Jiaotong Liverpool University to make a new workshop hub with the purpose of ensuring safety, enhancing interaction and achieving sustainability.

Keywords: Covid-19, Architecture, Design, Workshop hub, Vertical design, Moveable facility, Xi'an Jiaotong Liverpool University, Manchester Metropolitan University.

1. Introduction

It can't be denied that Covid-19 has dramatically changed the nature of social interaction [1]. Not only Covid pictograms, but also new technology been invented to reduce large gatherings and prevent viruses from spreading [2]. At the beginning of Covid-19, our surrounding areas change because we need to effectively stop it from becoming more serious. In the post-pandemic era, it keeps changing because Covid-19 has brought us many new ways to live, study or work such as virtual teaching, and we are trying to make a new place for these changes including mitigating unsatisfying consequences from Covid-19.

Therefore, in order to recover the social interaction with a priority of safety, many new ideas show up, such as 'Hybrid offices' or 'Outdoor classrooms' [3]. As workshop in universities is a significant period for students to learn, discuss and interact but has been seriously affected by Covid-19, this essay will design a workshop hub in post-pandemic campus. In this essay, two existing places Engineering Building in Xi'an Jiaotong Liverpool University (XJTLU), and Benzie Building in the Manchester Metropolitan University (MMU) have been chosen as case study. They both are the main building for workshop in two different countries and have made many changes after Covid-19 breaking out. According to one of differences founded by observation, interviews and surveys in two places, Benzie building has an atrium with a vertical design and active frontages while Engineering building is much more closed which is not helpful for stopping virus from spreading. Thus, the final design will open up two floors in Engineering Building and then design a creative workshop hub.

2. Methods

The research methods will be divided into two parts: Qualitative methods and Quantitative methods. Qualitative methods include observation of two places and interviews, while quantitative methods contain questionnaire making, processing, and data collection.

2.1 Interviews

2.1.1. Interview Sites

Engineering Building and Benzie Building are chosen as our interview sites. Engineering Building is located on the north campus of XJTLU, Suzhou, China. Benzie Building is home to the school of Art in Manchester Metropolitan University, United Kingdom. In order to collect more detailed information about the changes during the pandemic and their differences in two places, two interviews have been individually taken placed.

2.1.2. Questions

One topic of the interview in Engineering Building is about views from students on whether the workshop changed before and after the pandemic. For this part of the interview, the first question is about the changes in the workshop since and after the Covid-19, the other question is more related to the changes in the Engineering building.

The other topic of the interview is about the preference of workshop environment for students. The first question is concerning the preference of students for their learning environment during the pandemic, the other question connects to the aspects where the workshop could be improved to better adapt to the post-pandemic era.

As for interviews in Benzie Building, in addition to the similar questions mentioned above which will provide a good comparison between the two spaces, this interview also aims to gather some opinions from students and academics about the design of the Benzie Building. Interviewees have been asked to provide their opinions on vertical design in Benzie Building such as vertical stairs and atrium, as well as any strengths or improvements of Benzie Building as a workshop place.

2.1.3. Conducting Process

Three students from XJTLU participated in the interview. Two of them are from urban planning and the other is from urban design. Students were unable to return to school because of the outbreak of Covid-19, and the interview was conducted online.

Five students have been interviewed in Benzie Building. They are studying different majors, which are Fine Art, Photography and Illustration, and Animation. They came to this building for different reasons including having lectures, photo shooting and doing workshops. One interviewee was just sitting in the casual areas, waiting for some conservation with people in the building as inspiration for his work. All interviews have been taken place face to face and were recorded with their permission.

2.2 Questionnaire

The questionnaire is about collecting views and feedbacks from students in Engineering building about workshop design and difference of Benzie building. A total number of 18 students filled out the questionnaire, they are all studying urban planning and design. The questionnaire was published as an online survey. Students can complete it by scanning QR code. Their respond has been collected and analysed.

The questionnaire consists of two parts. The first part is based on the current situation of the workshop in the Engineering Building. Questions include the perspectives of students on the impact of the pandemic on the workshop, the views of students on whether the studio can meet all their needs, and so on. The second part of the questionnaire is about the attitudes of students towards the design improvement in the Engineering workshop based on the design in Benzie building. There are some questions about whether some design in Benzie building such as vertical gallery could effectively

decrease infection rate and whether workshop needs to be multi-functional including individual study rooms, group discussion tables, computer clusters and casual areas.

3. Results

3.1 The Results of The Interview in The Benzie Building

In the first part of the interview, some changes emerged after Covid breaking out such as online room booking and sign-in-out systems. However, some respondents complained about the inconvenience of the online booking system. In addition, interior decoration has also been changed for keeping social distance such as the ground floor cafe and tables in casual areas. One thing they enjoyed from the changes is that now there aren't too many people in the building.

In the second part, interviewees express their love to design in Benzie building especially the vertical gallery and multi-functional workshop. Compared with other buildings they have been to, they enjoyed studying in this building because they think this building could provide all they need while making a project. They came here very often and didn't mind if they were going to stay here for a long time. They also explained why they love vertical design because it provided an big open space with good light and ventilation as well as active frontage. The atrium largely improved interaction with students and academics. One of the interviewees has compared it with business building in the MMU. He thought the casual area in the business building is too overwhelming and its design is hard for him to interact with others.

However, there are also some negative feedbacks about the vertical design, for example, the vertical stairs have turned out to be not very welcomed. Students always avoid those stairs and consider instead of stairs, it could make some better design in this area. And because of the open area allow people to freely go to other floors without closed doors, student work is always stolen or damaged.

3.2 The Results of The Interview and Questionnaire in The Engineering Building

Changes and design in Engineering building are not satisfying. Many respondents think they are not very helpful in dealing with the pandemic. They also put forward some demands for improving the workshop environment, for instance, some of them want a personalized and private study space, others want a perfect place to study in a group.

As for the current situation of the workshop in the Engineering Building, results of questionnaire show that about 90 percent of the respondents believe that social interactions in workshop have been affected by pandemic. In the current workshop, it is difficult to discuss and work in groups while maintaining a safe social distance and at a high risk of being infected in a closed room. In addition, more than half of the students feel that the current workshop does not meet their needs which should include a variety of functions and options.

As for attitudes to the design improvement in the Engineering workshop, their answers seem positive that all the students expressed their interest in vertical design and multi-functional workshop. They think it is a good idea to divide the workshop into different parts, including an individual studying room, group discussion area, and rest area. Last but not least, more than 70% of the students agree that an online reservation system could be introduced to the workshop to reduce crowded gatherings as long as it is convenient to book.

4. Discussion

4.1 Evaluation Of Engineering Building and Benzie Building

According to our observation and information collected from interviews and surveys, it is concluded that there are lots of differences in two spaces including changes during Covid-19 and workshop design.

To sum up changes in two places, the entrance of the Engineering Building has a temperature measurement and a health code checking system to ensure people's health conditions and the elevators will be sanitized regularly. While in the Benzie Building, there are lots of pictograms existing everywhere such as a one-way system sticker on the ground, a social distance sign, or sanitizing reminder. Furthermore, students and academics also need to book a room online in advance and sign in or sign out every time they come.

Secondly, in terms of spatial design, although the Engineering Building workshop has different types of functions such as individual study rooms, group discussion rooms, lecture rooms and studios, it is still not enough, compared with Benzie Building. Moreover, Engineering Building workshop is flat and separated by stories while Benzie Building is open with a vertical gallery and an atrium.

There are also some negative feedbacks and problems from interviews and surveys such as stolen projects, unnecessary stairs and inconvenient booking system in Benzie building. They will all be considered and solved in the final design.

4.2 Design Improvements of Engineering Building

Due to the workshop being distributed on each floor in Engineering Building and its original design, it is suggested to open up the upper and lower floors to expand the space for reconstruction and improve ventilation to prevent the epidemic [4]. Figure 1 shows the overall design below and the whole space is built vertically inspired by Benzie Building

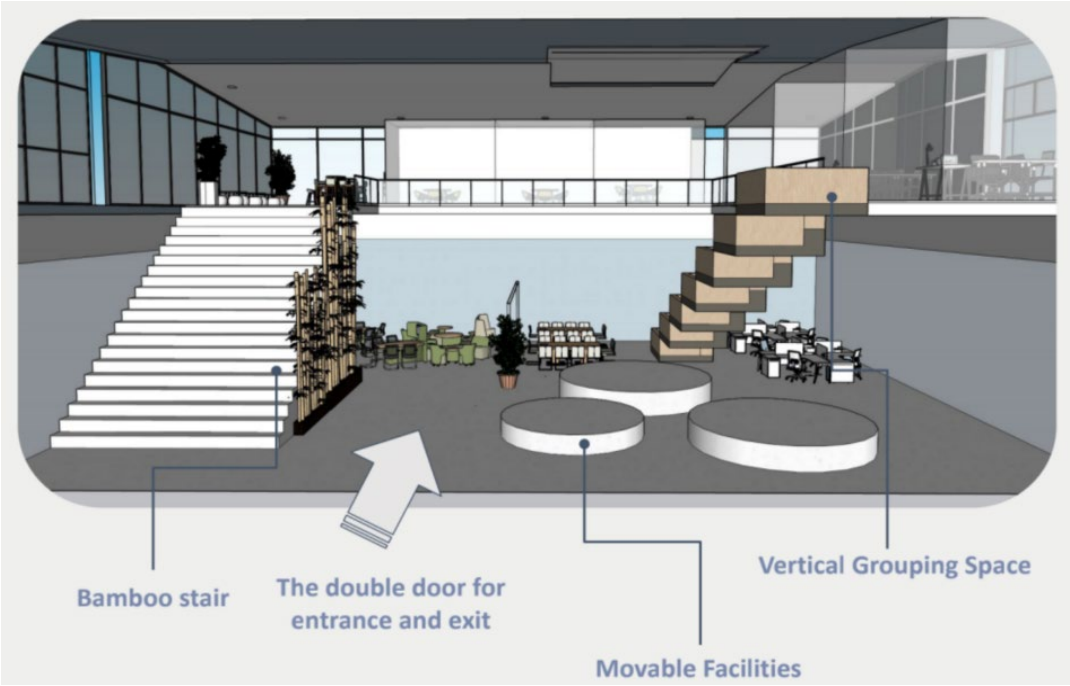


Figure 1 Overall design of workshop hub

4.2.1. Multi-Function Design

Stairs showing in Figure 2 can also be seen as casual areas for sitting and chatting. According to the office and coworking space designed by dMFK Architect in Frankfurt, green plants besides the stairs can not only increase the dynamic of space, but also play a certain protective role. Therefore, the design tends to put bamboo at the side of the stairs to enrich the interior space and prevent students from falling off the outside of the stair (Figure 2).



Figure 2 Bamboo at the side of the stairs

For the view of the first-floor studio, the green tables and chairs are the space for group discussion. These circle seats are comfortable and good for interaction (Figure 3). Additionally, the glass shield on the side can be used to write some notes and block the noise. On the other side, it can be a quieter study space. There are four tables and seats for individual study and some shared tables for grouping. All these seats can see the natural views from outside which is enjoyable and relaxing for long-time learning (Figure 4).

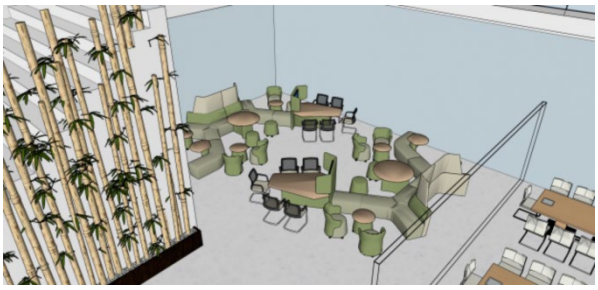


Figure 3 The view of the first-floor



Figure 4 The study space

The second floor of the workshop (Figure 5) is mainly divided into two functional zones. One part is the resting area, where students can drink tea, coffee and have a snack. The other part is used as the study area, compared with the study area on the first floor, the study area on the second floor is divided into several glasshouses, which are mainly used by students for self-study. Students can't make noise in these glass rooms so that they can focus on their study.



Figure 5 Multi-functional zoning of the second floor

4.2.2. Moveable facility

Moveable facility has been designed with a purpose of making the best use of existing resources to achieve sustainability. Besides, as Yaneva (2017) expressed that a good material arrangement will

allow users to deviate from expectations [5]. The facility also allows students and academics to freely make some changes on it. During the long-time observation in Benzie Building, it has been noticed that casual areas in the atrium will only be highly used during lunchtime. According to interviews before, it was reflected that workshop rooms in Benzie Building were always in high demand.

To efficiently make the best use of spaces, this moveable facility is designed to allow users to easily change the open spaces from casual areas into study spaces including individual study rooms and group discussion rooms (Figure 6). The shape of facilities is inspired by the organic floorplans by Isaac Morris, who uses the sponge as a metaphor for the porous campus and divides up spaces in an organic way (Figure 7).

The moveable facility is made up of changeable walls, sensors, noise-zero doors, and LED screens. Changeable walls will be kept down at lunchtime normally from 12:45 to 1 pm to create a casual area. At the rest of the time in a day, users can freely adjust the walls up or down. Sensors will indicate whether the room is occupied or not and it will be shown on a screen outside. Unlike the inconvenient booking system in Benzie Building, students or academics could also book a room on the screen. Moreover, some rooms have a projector on the wall for group discussion. Interior design in the moveable facility area will be live-with-nature style, which will use eco-friendly and re-used materials for construction and decoration, and numerous trees, plants, and flowers will be around.

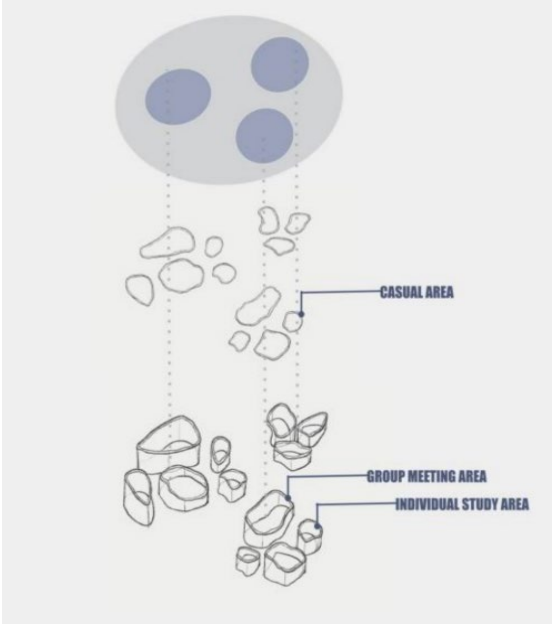


Figure 6 The moveable facility

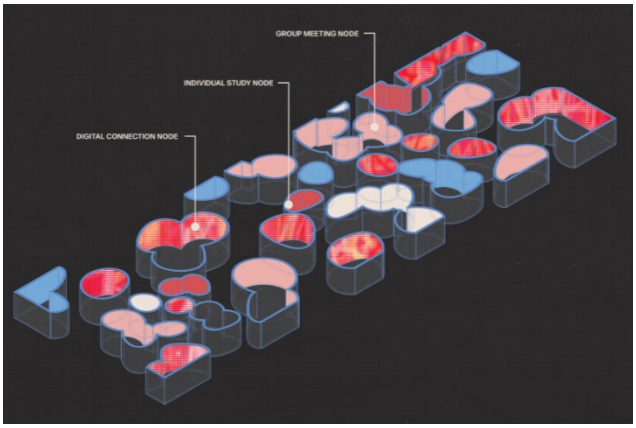


Figure 7 The shape of facilities

4.2.3. Vertical Design

Figure 8 is a new office space design from Carlo Ratti Associati (CRA), this design of CRA was inspired by the 'open innovation' theory by Harvard economist Henry Chez Bruce [6,7]. The design goes beyond the traditional open design and replaces it with a more complex structure to build a way that fosters innovation. It is safer in the shared space. Inspired by the above design project and Benzie building, the vertical design in our workshop (Figure 9) is used as a space for informal group meetings. According to the scientific data, the probability of the pandemic spreading outdoors is one-twentieth of that indoors, which indicates that the vertical design could effectively reduce the spread of the pandemic. In addition, in order to make it easier for students to pass up and down, there is a staircase on one side of the vertical design. This vertical design not only provide an open space and improves the utilization rate of desks and chairs, but also releases the shared space and enhances the interaction between students in a safe way [8].



Figure 8 New office design of CRA

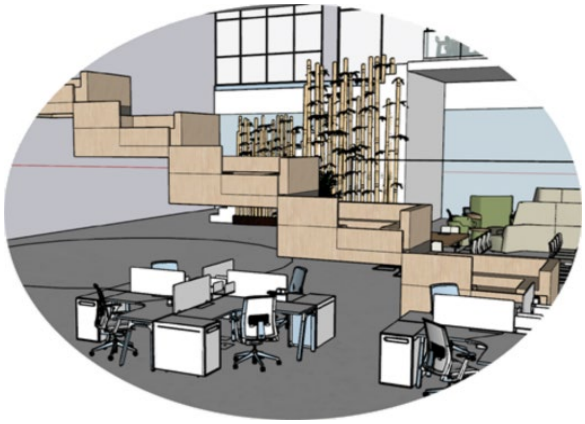


Figure 9 Vertical design in the workshop

5. Conclusion

This essay responds to the changes by Covid-19 in universities and create an idea for post-pandemic university. Lots of research through observation, interviews and surveys separately carried out in two different places to support the final design.

The final design chooses to be in Engineering building because although there are still some shortages from Benzie building, Engineering Building needs a bigger improvement and can provide a more suitable space to be designed. Engineering Building workshop is on flat floors with an enclosure design and inactive frontage. Our final design will open up two floors to create an open space and make some vertical design. There are three main characteristics in our design which is 'Multi-function', 'Moveable facility' and 'Vertical design'. It aims at enhancing quality of workshop with priorities of ensuring safety and sustainability in the post-pandemic university and it is expected to be put into effect in future.

References

[1] M .Calbi, N. Langiulli, F. Ferroni, M. Montalti, A. Kolesnikov, V. Gallese, M.A. Umiltà. The consequences of COVID-19 on social interactions: an online study on face covering. Scientific Reports. 2021, 11(1):1-10. DOI: https://doi.org/10.1038/s41598-021-81780-w

[2] M.A. Bazel, F. Mohammed, M. Alsabaiy, H.M. Abualrejal. The role of Internet of Things, Blockchain, Artificial Intelligence, and Big Data Technologies in Healthcare to Prevent the Spread of the COVID-19. In 2021 International Conference on Innovation and Intelligence for Informatics, Computing, and Technologies (3ICT) IEEE press, 2021, pp. 455-462. DOI: 10.1109/3ICT53449.2021.9581469

[3] J. Deshmukh, Speculations on the post-pandemic university campus–a global inquiry. Archnet-IJAR: International Journal of Architectural Research. 2021, vol. 15, pp. 131-147. DOI: https://doi.org/10.1108/ARCH-10-2020-0245

[4] T. Lipinski, D. Ahmad, N. Serey, H. Jouhara. Review of ventilation strategies to reduce the risk of disease transmission in high occupancy buildings. International Journal of Thermofluids. 2020, vol.7, pp. 100045. DOI: https://doi.org/10.1016/j.ijft.2020.100045

[5] A. Yaneva, Five ways to make architecture political. Bloomsbury. 2017

[6] C. Harrouk, New office space to meet the challenges of the post-PANDEMIC era [online]. 2020. Available at: https://www.archdaily.cn/cn/949841/qia-luo-star-la-di-she-ji-xin-ban-gong-kong-jian-ying-dui-hou-yi-qing-shi-dai-de-tiao-zhan

[7] H. Kawai, Open innovation university-industry collaboration: student idea contests and exit strategy in Japan. JFMRA. 2017 May;1(2):31.

[8] M.Babapour Chafi, A. Hultberg, N. Bozic Yams, Post-pandemic office work: Perceived challenges and opportunities for a sustainable work environment. Sustainability. 2021, vol.14, pp. 294. DOI: https://doi.org/10.3390/su14010294