Teaching spaces design and development at LSE

An evaluation of impact on teaching and learning

space

LSE Learning Technology and Innovation

01

executive
summary

Teaching spaces design and development at LSE: An evaluation of impact on teaching and learning

Overview

During 2015 a number of new teaching spaces were redeveloped to replace those lost as a consequence of the demolition of 3 campus buildings, part of the ongoing Centre Buildings Redevelopment (CBR) project. These redevelopment works were carried out by LSE Estates in consultation with Learning Technology and Innovation (LTI), the Teaching and Learning Centre (TLC) and AV Services. The resulting spaces are quite different from existing LSE classrooms as the projects were seen as an opportunity to experiment with modern, pedagogically sound approaches to learning space design.

This report is an evaluation of the design of 7 of those spaces and their impact on teaching, learning and teacher /student behaviour. The spaces under study included:

3 Parish Hall (PAR) classrooms (PAR LG.02, PAR 1.02 and PAR 2.02)

3 Tower 2 PC classrooms (TW2)

A new lecture room in the Old Building (OLD) (OLD 4.01)

Method

The evaluation of the user experiences of the spaces drew on grounded theory and data was collected using a number of qualitative methods to uncover how the spaces influence teaching and learning. To check for prior knowledge and methodology, a brief literature review was also carried out. 29 classes were observed for use of the space and most were video-recorded. 19 teachers were interviewed as follow-up and 169 student surveys were received and analysed. The data were processed to draw out common themes.

Design Intentions

Working collaboratively with colleagues in TLC and Estates, a set of common intentions behind the design of all rooms was identified, which included bringing students closer to each other and the teacher, thus facilitating interaction in the case of PAR and TW2. Furniture, colours and light were also given particular consideration to provide a flexible, bright and contemporary space. Critically, each project sought to break down the dominant linear approach to teaching spaces (rows of desks) that dominates the majority of LSE spaces.

The PAR classrooms were designed to facilitate case-based and mixed mode teaching with a layout that would accommodate a mixture of lecture and group work. The intention for OLD was to provide an intimate teaching and learning experience in lecture-focused classes. Finally, the TW2 rooms were designed to make interaction and discussion between students in computer-led courses easier.

Findings, Analysis and Conclusions

In the OLD 'lecture room' the intention to create a layout where teachers feel close to students and vice versa has largely been met. A closer connection between student and teacher would have been desirable and could possibly have been achieved by implementing the initial but potentially more costly design. Improved comfort and writing space for students, as compared to rooms with tablet chairs has also been achieved. Some teachers thought the teaching podium was small, but this could be addressed by providing alternative storage. Teachers would like to be able to use whiteboards and projector screens simultaneously. Lecturers appreciated that the seating layout made it easier to move around.

In PAR the aim to enable seamless transition from teacher led to student centred learning has been successful and has resulted in a space suited to both small to medium-size group work; thus enabling peer and active learning and 'lecture mode' in the same teaching session. There is also evidence that such an alternative layout has an 'attitude impact' thereby prompting lecturers to reflect on new teaching and learning possibilities afforded by the new space. Teachers and students have also praised the informal feel to the rooms, which encourages student discussion. The spacing between group tables also allows teachers to move around and direct their classes better. However, some issues arose where small cohorts were inappropriately timetabled in the room. Therefore, scheduling should prioritise mixed mode teaching for groups of an appropriate size as a priority. There were also some problems with inadequate natural ventilation and external noise arising from the CBR development, disrupting learning activities.

In TW2, teacher feedback suggested that the round tables would send a clear message to students, namely that the course is likely to involve collaboration. In practice, the high position of the PC screens hindered group work as students could not converse across the table. One of the initial desk designs featured 'sunk-in' screens that were intended to avoid this problem, but unfortunately it was the most expensive proposal. The layout did still allow for individual and pair work and with smaller classes teachers were able to freely move around the room to assist students in their activities. However, when the rooms were fully occupied teachers found difficulty moving around due to lack of space between students.

Teachers were also critical of the minimal lectern, which was chosen as a space saving measure. Both teachers and students also complained about high temperatures and lack of ventilation in the TW2 rooms. On a positive note, students found the environment visually bright and appealing.

In Summary

We can identify some common themes to consider for any future learning spaces developments at LSE. Firstly, the tensions between design and delivery where the pedagogically led design is value engineered such that it does not fulfil the original teaching and learning brief, have a significant impact on how effective a space is for learning. The sometimes disconnected relationships between stakeholders shaped the end product in a variety of ways. For example, the furniture selected by TLC and LTI (within budget) was exchanged by LSE Purchasing who secured a better deal on less appropriate furniture. This resulting small change had significant impact on the final student and staff satisfaction.

Secondly, the tensions between the ability to use learning spaces most effectively became compromised by the need to maximise the capacity of learning spaces for timetabling purposes. For example, the need to have a maximum capacity in PAR contributed to the lack of space between tables and the sometimes cramped feeling in the rooms. Equally, we found that many classes below the required capacity were scheduled in there.

Thirdly, we clearly identified the impacts of being engaged in the process later than the design or budget allocation phase. Many of the issues around traffic, whiteboard positioning and the lack of power arose from coming into the process late. There has been significant progress made between Peter Bryant (Head of LTI), Neil McLean (Director of TLC) and Ken Kinsella (Estates) on addressing this issue.

Finally, it was especially rewarding to find that when presented with modern teaching and learning space designs, LSE teachers actively considered the new pedagogical possibilities afforded by these new environments. This capacity to encourage innovation and experimentation was an intended outcome of the project and to see it reflected in the evaluation was encouraging for further projects.

IV

02

introduction

The aim of this report is to evaluate the impact on teaching and learning arising from the redesign of 7 LSE classrooms.

Out of these 7 rooms, one is located in the Old Building (OLD.4.10), three in Parish Hall (PAR.LG.03; 1.02; 2.03) and three in Tower 2 (TW2.4.01; 4.02; 4.03).

The first section of this report briefly summarises the literature on learning spaces. It reviews the most commonly used tools to evaluate the impact of educational facilities and the main findings of frequently cited studies.

The next section describes the methodology we used to conduct our study. It outlines our main research framework and explains how we analysed our results. This section reviews the different types of data we gathered and their limitations.

Following on from this we delve into the process and intentions that guided the design of the rooms. As we will see the 7 rooms can be grouped into three types depending on the building they are in. Room(s) in OLD, PAR and TW2 were built with different requirements and pedagogical aims in mind. We end each subsection with a description of the redesigned space.

The next section lays out our findings – the results from the interviews, survey and observations we carried out. We grouped our findings by type of room and subsequently organized them around recurring themes that emerged when we processed our data.

We then proceed to the analysis of our findings. In the discussion we evaluate the impact the rooms had on teaching and learning. In this section we compare our results with the intentions behind the room designs and with the findings from other studies. This allows us to see whether or not the design aims have been met, the reasons behind this and how we could solve certain issues that emerged.

We conclude this report by summarizing our findings, offering some recommendations and indicate avenues for further research. We hope that our study will be useful to inform new room designs and that our process can be replicated for future evaluations.

03

literature review

"successful planning is a collaborative process and not a template that can be applied to differing spaces"

Andrews, T. & Powell, D. 2009: 52

There are two common methodologies used to evaluate the impact of educational facilities on teaching and learning (Fisher, 2005). The first, more quantitative, compares the test results of students taught in different rooms. Brooks' 2011 study of "Active Learning Classroom" (ALCs) at the University of Minnesota exemplifies this approach. Indeed, the results of his evaluation showed that "holding all factors excepting the learning spaces constant", students taught in technologically enhanced environment (ALCs) "outperformed their peers taking the same course in a traditional classroom according to test scores" (ibid: 719). As Brooks points out however, this type of study does not help us understand how "learning spaces affect the students' perception of their learning experience" nor how the space "constraints or facilitates faculty teaching practices" (ibid: 725).

This is where the second common, more qualitative methodology is useful (Fisher, 2005: 165). This approach combines several "deep research techniques" to try to uncover how spaces influence teaching and learning (ibid). One of the most cited examples of this approach is Jessop, Gubby and Smith's study of traditional and redesigned learning spaces at the University of Winchester (2012). Their research entailed class observations, student survey and interviews with teachers and estates staff (ibid: 191). The data was then coded, combined and clustered into themes using a "codes, categories and concept approach" (ibid: 192). Jessop et al found that in traditional rooms teachers felt constrained as all the furnishing was fixed (ibid: 193). Furthermore,

narrow walkways made observing group work difficult (ibid: 194). By contrast most interviewees found the redesigned rooms flexible, with little "cluster to constrain activities" and "without us-them divides between student and lecturer" (ibid). Finally, Jessop et al noted that, from an estates' perspective, "managing flexible spaces presents challenges" (ibid: 195). One of the room booking officers even described the "complexity of allocating rooms" using the image "a Rubik's cube" (ibid).

Other studies using similar methodologies came up with comparable findings. Wilson and Randall (2012) also used class observations and surveys to evaluate the impact of the redesigned "Pod Rooms" at Southern Cross University. The main research tool used was an emailed survey composed of six questions focusing on the influence of space on the faculty's teaching (ibid: 8). Wilson and Randall found that the staff praised the increased opportunities the pod rooms afforded for "informal, communicative and collaborative learning style tasks" (ibid: 12). Teachers also noticed certain "organic group memberships that arose from the layout of the space" (ibid: 13). On the other hand, faculty regretted the "obtrusiveness of the computer monitors" and the barrier created by the "lectern between teachers and students" (ibid).

Using the same qualitative research tools as the two previously cited studies, Andrews and Powell's (2009) evaluation of redesigned teaching and learning spaces at the University of Queensland yielded similar results. They carried out observations, distributed surveys

to staff and students and carried out semi-structured interviews with selected teachers (ibid: 49). According to Andrews and Powell, lecturers particularly praised the flexibility of the space and the "ability to seamlessly move between different modes of teaching" (ibid). Students agreed, explaining that the room allowed for an easy switch between "individual and group work (and back)" (ibid: 51). Andrews and Powell concluded that more studies of the sort should be carried out to gather "users' feedback" (ibid: 52). Indeed, this feedback will be particularly helpful in designing new rooms since "successful planning is a collaborative process and not a template that can be applied to differing spaces" (ibid).

Finally, all the researchers cited above have commented on the psychological impact of rooms layout on staff and students. Jessop et al noticed for instance that students seem to "adopt the mode of learning signalled by the furniture arrangement" (2012:197). Wilson and Randall also pointed out that, during interviews, "staff using the new rooms commented on an increase in self-reflection about their teaching" (2012:12). Graetz and Goliber have labelled this the "attitude impact" of learning spaces (2002: 15). They explain that as staff and students "enter the classroom, they form an impression of that space and experience an associated emotional response" (ibid). In other words, "desks arranged in rows facing a central podium suggest lecture" whereas "tables scattered about the room suggest collaboration" (ibid).

04

methodology

Overall Research Framework

As we have said, the overarching aim of this project was to evaluate the impact redesigned rooms had on teaching and learning. To do that we followed a 'grounded theory' framework, a method whereby "theories and arguments are discovered from the systematic collection and analysis of data" (Glaser and Strauss, 1968: 1). In other words, we started our research without a specific thesis in mind, without an hypothesis to prove or disprove. Instead we began gathering data using Fisher's "deep research techniques" namely observations, interviews and surveys (2005: 165).

Once we collected enough data, proceeding like Jessop et al, we processed it using a "codes, categories and concept approach" (2012: 192). As we reviewed the information gathered several repeated ideas became apparent. In line with our grounded theory framework we started "coding" these ideas, creating categories under which these recurrent ideas could be grouped (ibid: 106). When we started analysing the interviews of lecturers' teaching in PAR for instance, it became clear that a lot of their comments could be grouped under the theme "group work". We then went through the students' surveys, our observation notes/diagrams and videos as well as the teachers' informal emails to extract any information pertaining to group work.

The next step was to analyse how the teachers' comments, the students' feedback and our observations all fit together (see findings). Once all the data was coded, grouped and analysed it became possible to draw some conclusions about the redesigned rooms' impact on teaching and learning.

Data Sources

Firstly, to gain insight into how room design impacted teachers we compiled and coded the comments lecturers made when replying to our initial emails. This research technique known as "informal comment analysis" is particularly useful to review the spontaneous responses from different actors concerned by the research project (Hammersley and Atkinson, 1983). These comments helped us generate some interview questions and identify some key categories for our analysis. Overall we logged 11 comments: 2 for OLD, 8 for PAR and 1 for TW2.

Our second research tool to gather data about teaching and learning was "non-participant observation". As its name suggests non-participant observation is observation with limited interaction with the subjects involved and thus enables non-obtrusive data collection (Liu and Maitlis, 2010). In our case this entailed sitting at the back of the room and observing the seminar or lectures without interfering. Where possible we attended the seminar in two different rooms (a 'redesigned' and a 'control' room) to see if/how the teaching and learning experience changed. Our observation notes and diagrams (annex observation note template + diagram example), once coded, helped us generate some interview questions and identify some key themes. We also recorded videos of the lectures/seminars from which we isolated clips to compare with the teachers' and students' comments.

Overall we observed 29 lectures/classes: 4 in OLD, 11 in PAR and 8 in TW2 as well as 6 control rooms. Our 'control' opportunities were limited by the fact that many teachers did not teach the same course in another room. We also recorded 26 lectures/seminars as 2 teachers refused to be filmed.

We then interviewed lecturers to gather data on the influence of the redesigned spaces on teaching. We carried out "semi-structured interviews", meaning we had prepared some questions but allowed new ideas to be brought up during the interview (Bernard, 1988: 203). We used a mix of predefined questions (based on Wilson & Randall 2012's staff survey questions–annexed) and more tailored ones based on our observations and informal comments. We followed-up on certain themes that arose during the interviews themselves. We then transcribed the interviews, coded them and extracted themes from the teachers' answers. Overall we carried out 19 interviews: 3 for OLD, 8 for PAR and 8 for TW2.

Finally, we used "qualitative survey research" to gather information about the impact of the redesigned rooms on the learning experience (Jansen, 2010). We distributed short surveys at the end of the classes observed to gather student feedback.

The survey was the same for every class and asked four open-ended questions (annex student survey). It was deliberately short so it could be distributed, filled and collected at the end of lectures/seminars. Indeed, we opted for a 'physical' survey as

"students generally tend to ignore e-surveys" (Jessop et al, 2012: 192). This meant however that sometimes students talked to each other while filling in the surveys. Consequently, some of the answers we got were not very personal but the result of group consensus. Overall we collected 169 surveys: 22 in OLD, 98 in PAR and 49 in TW2.

In addition to coding and categorizing we used "word clouds as a text mining tool" to analyse survey results (Shawn et al, 2013). The first question of the survey asked: 'what three adjectives would you use to describe the room?'. The idea was to gather the students' spontaneous thoughts about the space. All their answers were aggregated by type of room (i.e. OLD, PAR, TW2) and presented as word clouds (see annex word clouds). As Graetz and Goliber predicted (2002: 16) most of the students' comments pertained to the physical aspects of the rooms rather than teaching and learning per se. It is important to note however that temperature, light and ventilation all have an impact on the students' focus and alertness (ibid). Word clouds thus gave us some information on the physical factors that could affect students' learning.

05

room design

Old Building (OLD.4.10)

OLD.4.10 was designed as a direct replacement for a small lecture room in the now demolished wing of the St Clements (STC) building. Given the short timeframe available to plan and develop the new space the priority was placed on fulfilling the same usage requirements as the STC room.

The old STC room consisted of straight rows of chairs with integrated writing tablets. The intention with the new lecture room was to improve on that provision by offering more comfortable seating and increased writing space. The new design also aimed to enable students to feel close to the teacher and vice-versa. Special attention was to be paid to the colour scheme to create a focused learning environment. Other key concerns included providing good sightlines from all parts of the room as well as a strong Wi-Fi signal to allow students to use their own devices.

The final set of challenges to be addressed pertained to external noise. Indeed, the new room was going to be located next to the main student cafeteria. This meant potential noise and smell around lunch time. Moreover, the new room was going to face the campus redevelopment building site, increasing the risk of external disturbances. As a result, noise mitigation doors/partitions and secondary glazing for the windows were requested.

Initial design for the space consisted of a semi-circular sitting arrangement surrounding a central stage for the lecturer. This however required custom furniture to be built and the design was abandoned as the supplier did not submit a final proposal and would have a higher cost to implement than standard furniture.

Instead the room was fitted with four rows of three sets of seats oriented towards the lecturer. The first row is composed of three sets of 4 seats with a wheelchair space at the end of each set. The other three rows are divided into 3 sets of 6 seats (bringing the overall capacity of the room at 69 students). All seats are cushioned, fold individually and the room is not tiered. The lectern is in the middle of the room, between the two screens (although slightly closer to the left screen). There is one, large whiteboard on the left side of the stage (from the students' point of view).

Parish Hall (PAR)

The design process for the PAR classrooms started with extensive conversations with the key teachers expected to use the space. A desire to use the case method of instruction was clearly expressed by faculty, especially by the head of the accounting department. As he wrote in the university course guide, he intended to "conduct case study sessions in groups of 55 students". During those seminars "students should expect to be cold called and not count on hiding behind classmates who volunteer to participate".

The nature of these sessions thus demanded a space suitable for both lecture-style teaching and small to medium-size group work. In other words, the space had to be agile and flexible without having to move furniture to switch between the different modes of teaching. The case method of instruction also implies easy interaction between students and teachers, hence circulation around the space was carefully studied. Furthermore, students needed to use their own technology in class requiring desk space, high-capacity Wi-Fi and charging points. Finally, more generic requirements such as capacity, light, comfortable temperatures and ventilation were taken into account in the design process. The idea was to create a general décor that provided a bright and inspiring environment with clear sightlines to projector displays.

As a result, the rooms in the lower ground (PAR.LG.03) and first floor (PAR.1.02) were fitted with 10 plectrum tables of 6 seats divided into two rows putting the maximum capacity at 60 students. The lectern was placed at the front of the room, between the two screens. The second floor room (PAR.2.03) was fitted with 4, 8 seat plectrum tables and 4, 6 seat tables putting the maximum capacity at 56 students. On the front row the two large tables were placed in the middle with the smaller tables on each side whereas in the back row the smaller tables were in the middle with the bigger ones on each side. The room was equipped with two screens and the lectern was placed on the left corner of the stage (from the students' point of view). In all three rooms the tables were spaced to allow the teacher to move around and the tables 'pointed' towards the stage to ensure that all students could see the screens. Charging points were placed around the walls of the rooms. The three rooms were painted white and all original windows as well as the 2nd floor vaulted ceiling were kept.

Tower 2 PC Rooms (TW2)

To replace the STC PC rooms lost as part of the ongoing campus redevelopment, three similar rooms were developed in TW2. The new PC rooms were going to be used for statistics classes and when not booked, would double-up as open access PC rooms. All existing partitions on that floor of TW2 were removed and the floor plan redesigned to create the new PC rooms.

The first step when designing the layout of the new rooms was to consult the main users of the spaces, namely the statistics department. It was decided that the rooms should enable students to work individually, in pairs or groups and thus needed to be able to converse without moving around. Teachers also wanted to be able to move around the rooms to help students with their assignments. There was some demand for lecture-style teaching hence sightlines from the seats to the projector screens had to be maintained. The new rooms were to be equipped with the PCs and monitors from the lost STC room and with sturdy furniture to withstand daily wear and tear.

With these intentions in mind, TW2.4.01 and 4.02 were fitted with 5, 6 seat round tables scattered across the rooms (maximum capacity: 30 students). TW2.4.03 received one less table, putting the overall capacity of the room at 24 students. One of the initial design propositions had the screens slightly "sunk-in" the tables but this option was abandoned for cost reasons. Instead the screens were mounted onto adjustable height monitor arms. In 4.01 the projector screen is in the middle of the stage, the whiteboard is on its left and the lectern further left (from the students' perspective). In 4.02 and 4.03 the projector screens are in the middle, the whiteboards on their right and the lecterns further right. All three rooms have been painted white with mainly white and light yellow furniture.

06

findings

"students are more engaged if they feel the lecturer can look at them"

OLD.4.10

Room Layout & Intimacy

Lecturers made several comments about the size of the room. As explained below (see whiteboards & screens), teachers in Old.4.10 have a tendency to lecture on the left side of the room. Teachers with small cohorts (12 and 13 students) were quite happy with the room since their groups were small enough to fit in the left hand third of the room. The same lecturers also thought that it would be harder to teach bigger groups as some students would have to sit on the right and would not see well. The two lecturers agreed that the room provided a relatively "intimate learning experience", allowing them to talk to students. One of our interviewees however added that a "Harvard style horseshoe layout would be even more intimate" as the students would closely surround the lecturer.

Contrary to what lecturers with small cohorts thought, teachers with larger groups (60 students) were actually quite positive. One of them told us that Old.4.10 "fills a niche LSE is not terribly good on"; he felt that the school had a lot of small and big rooms but very few middle-sized theatres like this one. He added that the room could take all his students yet did not feel too empty either. He explained that the wider layout of the room made it "less cavernous and off-puttingly large" than many traditional, deeper lecture halls. The lecturer concluded that intimacy was hard to achieve in a room that big yet he felt that the students were more engaged in Old.4.10. He explained that, because the room was not too deep, he could see all his students and: "students are more engaged if they feel the lecturer can look at them".

Another set of comments made during the interviews was about mobility and lines of sight. One lecturer appreciated the fact that the layout of the room enabled him to move around. His comment contrasts with the fact that he stayed behind the lectern throughout the lecture we observed. This might however be because he could not get hold of a working wireless microphone and thus had to stay close to the podium microphone. The lecturer added that being able to move around also gives the students better lines of sight, either to the board or to the lecturer himself.

Finally, one teacher commented on the lack of tiered seating in Old.4.10. He explained that the absence of tiered seating improved his lines of sight; it allowed him to see all his students at a glance. He explained that this was an improvement on other rooms where you end up with a "crick in your neck" if you try to communicate with the students at the back.

As opposed to the teachers' overall positive comments, student feedback about the room layout was quite negative. One of the main concerns expressed in the survey was that the room was too wide thus sometimes, depending on where the teacher was standing, students could not see their lecturer and the slides simultaneously. Some students also explained that, if they sat on the sides of the room, they felt far away from the lecturer. To correct this issue one student suggested that the seats should be moved slightly so as to surround the lecturer a little more. Finally, several students complained about the non-tiered seating. Indeed, they wrote that they could not see too well from the back of the room.

Tables, Chairs & Lectern

The tables and chairs were the first items most teachers commented on. Lecturers were quite positive on that topic, stating that the "substantial desk space made it easier for students to take notes". One interviewee added that, compared to the small desks attached to the chairs in Clement House, the fixed tables in Old.4.10 were more convenient. These comments back up one of our main observation, namely that the tables were deep enough to accommodate even the bigger laptops. Moreover, a lecturer explained that he enjoyed the fixed and padded tables and chairs because it "reduced noise disturbance". Indeed, latecomers in Old.4.10 cannot, unlike in other rooms, disrupt the lecture by moving or knocking chairs around when they arrive.

The comments in the student survey also back the teachers' and our observations. Answering a question about what they like about the room, a majority of students praised the comfortable seats and large desk space. The big tables and padded seats could also have influenced the adjectives the students chose to describe the room. Indeed, two of the four most used words were, according to the survey, 'comfortable' and 'spacious'.

Teachers however were not as positive when it came to the lectern. When prompted about the resized teaching podium, a lecturer said that it might have been too reduced. He stated that he "did not have enough space to put his coat, laptop and documents on the lectern". He also explained that he started by putting his belonging on one of the tables but realized that it blocked some of the students' sightlines.

The lecturer thus concluded by suggesting that an extra desk could be added to the side of the podium.

Whiteboards & Screens

A second set of comments relates to whiteboards and screens. Due to the width of the room, two boards and two screens were installed to ensure clear lines of sight. In one interview a lecturer explained that he enjoyed the whiteboards as they are big and at good height. He considered it a nice "step up from the low mobile boards in Clement House". Some students also commented on the screens, stating that the presence of two projectors made for easier viewing.

The same teacher however regretted that only one of the two (screen or board) could be used at a given time. Indeed, the screen can only be pulled down in front of the board, covering three quarters of its surface. The lecturer explained that this impeded his teaching as he was not able to project questions on the screen and go through them on the board.

Teachers and students also pointed to a major disadvantage of having two boards and screens: having to choose a side. Indeed, as one lecturer explains, the "danger when you have two screens is doing something on one side [of the room] that the pupils on the other side cannot see". As we observed teachers tend to use the left board and screen more as they are closer to the lectern. In lectures with a limited number of students (13 in our example) all the pupils sat on the left side thus limiting the problem. In bigger lectures (35 in our case) some students have to sit in the middle and right of the room.

This becomes an issue as the teacher, demonstrating on the left screen, turns his back to the students on the right. This issue has also been raised in the surveys we distributed where students complained that they could not see the board from the sides. Some students even suggested that the podium should be placed at the centre of the stage or that Old.4.10 should be divided into two rooms.

Room Location

The final set of comments has to do with Old.4.10's proximity to the cafeteria. The teachers' stated that they had not noticed any smell from the restaurant even if they taught around lunchtime (11-12h and 14-15h). They also added that they were usually focused on their lecture and it was perhaps better to ask the students about this. According to the survey results only one student commented on the room's proximity to the cafeteria, stating that it was sometimes noisy. Finally, two teachers remarked that the room's entrance (the space right outside OLD.4.10) was often quite crammed but that this was not a major issue.

PAR (LG.03; 1.02; 2.03)

Small Group Work

All teachers interviewed agreed that he tables and layout in the new Parish Hall rooms facilitated small group work. As explained earlier (see room descriptions), all three rooms are fitted with plectrum tables that allow 6 to 8 students to face each other. In theory, tables should be oriented so that no one has their back to the board.

Lecturers stated that the layout "naturally offered to split students into small groups" which they thought "was a really good set up for class discussion". One teacher added that the set-up created a "sense of fun debate" particularly conducive to group work.

The PAR tables and layout were often contrasted with traditional row arrangements. Lecturers explained that the Parish Hall layout was much better for small group discussion. Indeed, as one teacher argued "rows do not reflect real life speaking situations […] no meeting is ever organized this way". The row layout hinders discussion as students have to turn around to look at and talk to each other. Lecturers concluded that the "island layout" where students can face both the teacher and each other encouraged "community learning". In the words of another interviewee, "in a frontal arrangement [students] only look at the teacher" facilitating "passive reception". All three Parish Hall rooms by contrast, offer a "more communicative environment".

Teachers also appreciated the PAR rooms' layout because it enabled student-to-student support. As one lecturer explains "thanks to the way the seats are angled" students can "quickly whisper or look at" their peers. It is thus easier for them to "get support from their fellow students if they don't know what's going on". Another lecturer also noticed "immediate bonding between students at the same table". She "observed that groups form mentally" and "start supporting each other". The teacher concluded that this was great for group work and "peer learning" – the process by which students "share and learn from each other".

According to four interviewees the layout has also made them rethink the way they teach their course. As one teacher said:

The PAR tables are ideal for 5 or 6 people working together which we tend not to do so much. The fact that the tables are laid out like that does make you think: well, how should I use them?

The teacher stated that she should probably conduct more small group exercises instead of whole class discussion. She pointed out however that she only had 10 students in her class and that splitting them into smaller groups might be unnecessary. She concluded that:

As much as she liked the space, she did not think that her class should be a priority for the room; She thought that bigger groups would benefit more from that room

Another teacher also thought that it was "a shame she used the room only for straight lectures". She added that she would like to have more seminars in PAR so she could do more "mixed style" teaching, combining "presentations" and "group work".

Two teachers mentioned issues relating to layout and group work. The first was that the room was "not so good" for activities where you move around for example "when you ask students to stand up and meet different people". The lecturer concluded that the "lack of space in the middle of the room" made it less suited to this kind of "mingling activity". The second issue raised was that the tables could have a slightly isolating effect.

Indeed, one lecturer pointed out that "students usually sat with their friends, excluding certain students from other disciplines". That being said the teacher stated that she could force the students to sit differently.

Overall the students' feedback seemed to match their lecturers' positive comments. Indeed, students in all three rooms wrote that the tables and layout worked well for small group discussions. The majority of those comments were responses to the survey question: 'what do you like about the room'. One student also added that he/she thought that "the way the room was organized was much better than the traditional rows of desks". Again this matched the lecturers' comments previously mentioned.

Informality

Lecturers in all three rooms also noted that the layout created an informal atmosphere. As one teacher explained, at the beginning of her first workshop in PAR, "students immediately sat with their friends around these bigger tables" creating a "somewhat more relaxed" atmosphere. She added that she "remembered vividly that [she] enjoyed that lecture". Another teacher in the same room made a very similar analysis. Indeed he stated that he "saw a lot of the students in other classes" yet he felt that "the class in PAR is friendlier". He attributed this to the "informal seating arrangement" which encourages participation and collaboration. A third teacher in another PAR room also came to a similar conclusion. He explained that:

Frontal lecture arrangements (row layout) where everyone watches the teacher are a lot more impersonal. It doesn't matter where you sit because there is no emphasis on social interaction. PAR by contrast, with those collaborative tables, recognizes every person as part of the arrangement.

The lecturer thus concluded that he thought the layout made students feel "more comfortable and at home in the room".

The students' comments regarding informality were the same as their teachers'. Some said that the "atmosphere [felt] less formal" and thus "invited discussion". Others added that they liked the room because "it felt like being with friends". One student also described the room as "inclusive", echoing the lecturer's comment about the "PAR layout recognizing students and teachers as part of the same arrangement"

Movement, Monitoring & Lines of Sight

The teachers' feedback relating to movement and lines of sight was mixed. As one lecturer stated, "[he] liked the room because he could move around a bit". According to him, the ability to "get into the groups of students" helped him "direct his class better". Indeed, he explained that "the way the tables are spaced […] gave him more opportunity to look over people's shoulders and see if they were doing the activity correctly". The teacher added that rows made it "harder to monitor students" because you could only move down the aisle and "see what the students at the end of the rows were doing". In this regard he much preferred the Parish Hall room.

Some lecturers however made more negative comments. One teacher for instance stated that "[he] was afraid to move around" when he lectured because if he did "some students might not be able to see him". Indeed, because the students did not all face exactly the same way, he felt that if he moved around some students would have their backs to him. He added that the lectern was also "a bit in the way". He thought it was "quite big" and did not want to "stay behind it all the time" because "then [he] would be far from the students". The issue however was that the students' tables were "close behind the lectern" so "[he] couldn't really stand directly on the other side of the podium either". Finally, some teachers noted that "sometimes students sat with their backs to the board". Our observation did indeed show that some tables had been slightly turned resulting in students having their backs to the stage.

Students in all three rooms also commented on this issue. They complained that they "could not see the screens from some chairs" (LG), that "some seats were not facing the board" (1.02) and that "tables did not allow everyone to face the screen" (2.03). Again it must be noted that our observations showed that some tables had been turned and were not in their intended orientation.

Space

Teachers also had several issues with the size of the rooms. One lecturer stated that dividing her class into small groups was easy in PAR yet "conversely [the room] was not very well adapted for whole class discussions". She explained that given the size and layout of the rooms students were sitting far apart sometimes with their backs to each other. The teacher felt that "[she] had to work harder to get a [whole class] discussion going" especially with "less confident students or those with little experience in projecting their voices". We observed that indeed the students were quite spaced out, probably because it was a 16-person seminar in a 60 seats room.

Again students' feedback matched the lecturers' comments. They wrote that the tables "worked for small group work" but were "uncomfortable for larger groups and presentations". They regretted that the tables could not be "grouped together" and that they remained in "small islands" (multiple tables of 6). Students thought that this created a "segregated whole class dynamic". Students thus suggested that tables should be in shapes that fit together".

A lecturer in another PAR room raised a second issue related to the discrepancy between her class size (15 students) and the size of the room (maximum capacity 60 students). She explained that in some lectures the students all sit next to the exit at the other end of the room. Given the size of the room and the size of the group, the teacher found it hard to talk to her students if they sat far away. She concluded by suggesting that a curtain could be added to halve the room for small seminars.

"as soon as students enter the room they know what is expected of them"

Finally, two lecturers drew a comparison between the PAR rooms and 32L rooms. One teacher explained that the class he taught in 32L felt more intimate than the same seminar held in PAR, "probably because the PAR room was too big for the size of the class" (13 students in a 60 seats room). Another lecturer added that he preferred the Harvard lecture room in 32L because unlike PAR, it was small enough to integrate everyone. That being said, the lecturer concluded that no matter the room, "beyond 40 students it's hard to make sure everyone participates in group work".

Whiteboard & Screens

Out of 8 teachers interviewed regarding the Parish Hall rooms only one commented on the whiteboards. He explained that in PAR.1.02 the whiteboard was rather small compared to the overall size of the room. This was, in his opinion, "unfortunate for someone like [him] because [he] uses the board a lot". He thus concluded by saying that he would like to add a "bigger board in that room".

Lecturers made more comments about the double screens/projectors. One teacher stated that the "double screens were necessary" given the width of the room yet she "felt like it was a bit of a challenge to orient herself to both sides of the classroom".

The lecturer went on to explain that the difficulty was to fight "anatural tendency to go to one side rather than the other". This point was also brought up by another teacher who "realised that he used the left side more often because he subconsciously thought more students could see it" (PAR.LG.03). Overall some teachers thought that "students' attention was divided because they looked at two screens" whereas others concluded that "with two screens it was never difficult to see".

Only two students commented on the rooms' double screens. Both comments were answers to the survey question: "what do you like about the room". The two students agreed that having two screens made it easier to see the teacher's slides.

Ventilation, Noise & Light

The teachers made a few comments about the ventilation in the Parish Hall rooms. The only comment made on that topic for the lower ground room was that "the air was good and the ventilation was great". Lecturers using the second floor room were more negative, stating that they "found it super hot in there". In an email a lecturer also informally commented on the lack of climate control. He wrote that it made the room "awfully humid and unbearable – not conducive to creating a comfortable learning environment".

Students in the lower ground floor room seemed to disagree with their teachers' comments. Indeed, they described the air as "stuffy" and "unfresh" and regretted that "not all windows opened". Students on the second floor room agreed with their lecturer and commented on "the high temperature and humidity".

Two teachers also raised noise-related issues in PAR.1.02. One teacher mentioned the noise coming from students in the corridors outside the classroom. She said that she could hear every word the students outside the class were saying and often "had to go and tell them to be quiet". Another interviewee explained that he could not have the windows open "because there was too much noise coming from outside". A teacher lecturing on the second floor informally commented on the same issue. He argued that "the noise from the pub and SSH plaza downstairs" made it impossible to open the windows, further reducing the amount of "natural ventilation" available.

On this issue students' comments matched their lecturers'. Responding to a question about what they disliked about PAR.1.02 students said it was noisy and "they could hear what was going on outside the room". Students on the second floor also agreed with their lecturer writing that the "air was not fresh but it was too noisy outside to open the window".

Interviewees teaching on the first floor made several positive comments about the light in the room. One lecturer stated that she liked the fact that the room was "airy and light", adding that it positively impacted "the way students felt". Another teacher also explained that the "high ceiling and light helped her morale" and made her realise that she was part of a "comfortable institution". She concluded that the lighting created a "sense of optimism" in the room.

Students were equally positive about the light on all three floors. All students agreed that the rooms were "bright" and "spacious". They also appreciated the high ceilings on the first and second floors. Students also added that the "space and brightness kept them engaged" throughout their seminars.

TW2 (4.01; 4.02; 4.03)

Layout & Group Work

Some teachers and students appreciated the circular tables because they encouraged group work. As one lecturer explained, when the students are in "their little circles, they interact a lot", "they see each other so there is

more interaction between them". The teacher added that he wanted the students to participate and was thus quite pleased with the layout. Several students also thought that the "round tables were good for working in groups". They agreed with their teacher, explaining that the layout was good because they "could see each other's faces". A lecturer concluded that:

As soon as students enter the room they know what is expected of them. So intuitively the layout is a suggestion to them that this is a joint class work type of exercise. It also reduces their anxiety levels knowing that they will work with other classmates.

The teacher thought that the layout benefited his students as it was adapted to the collaborative seminars he conducted.

Two teachers were quite indifferent to the TW2 rooms' collaborative layout. Indeed, they explained that in their class the focus was on "individual work" thus the students "were working on their own PCs". They added that in those classes the students "did not speak much" because they did not do collaborative exercises. The teachers concluded that in their case the round tables did not have "extra merits" as they did not do group work.

Several teachers also pointed out that the position of the PC screens hindered collaboration. As one lecturer phrased it:

As a whole I like the concept of the round tables. I'm not sure it completely works however because the screens block interaction across the table. If anything the students interact with the students next to them. I don't think there can be full table interactions.

Indeed, as we observed some students had to stand up to look over their screens to interact with the person sitting opposite them. Four other teachers also commented on this issue, reiterating that "the screen was too in the way to work with more than the person next to you". One lecturer thus concluded that the screens' position "forced the students to collaborate only with the student adjacent", "just like they would in a row layout".

Teachers raised two more issues regarding the layout and tables. First, one teacher explained that "students often have to move to work together". Indeed, the screens on circular tables are angled thus, as we observed, students sometimes move to see their peers' screens. The teacher added that it was "easier for students to look

at their neighbours' computer when they were sitting in a row". Secondly, lecturers commented on the lack of desk space. They explained that there is "so little table space left that the students cannot do any writing". In an informal email, a teacher added that the "students did not have enough room to set up their laptop and work comfortably". A teacher thus concluded that "if you wanted to do anything not computer based, the room is not really flexible for that".

Monitoring

Two teachers thought the layout enabled them to better monitor students. One lecturer (with 11 students in 4.01) stated that the "space facilitated the help of the teacher a lot". Indeed, as we observed, "because the tables are round [she] could actually see what the students were doing when [she] went through the class". The lecturer contrasted the round tables with the row layout "where she usually cannot squeeze between students" and ends up "just moving up and down the corridor". In 4.01, she thus said that she "tended to be closer to [her] students and could help them more". Another teacher (with 12 students in 4.03) added that he "also taught in a bigger room in STC" but "he much preferred TW2". Indeed, he explained that, in St Clements, "the students were far away on each side of the room" whereas in TW2 "they were clustered around the centre which made communications to the whole class easier".

Two other teachers by contrast thought that the layout did not facilitate teaching and contact with the students. One lecturer (with 16 students in 4.01) explained that "the room was bit hard for group explanation" because he "could only talk to one side of the tables at a time".

Another teacher (with 22 students in 4.02) added that "in the TW2 layout it was harder for him to remember people's faces and names". He explained that this was due to the fact that "he never saw [the students] in full frontal position", he only "looked at their profiles" and thus "had less contact with them".

Movement

Several interviewees also stated that they had trouble moving around in all three TW2 rooms. One teacher (with 16 students in 4.01) stated that:

The main problem I had was when I had to go from one place to another and there was one table in between. You can go through if there is no one at the table but as soon as students sit there you can't pass.

Another lecturer (with 10 students in 4.01) also explained that "sometimes it's difficult to walk around because the tables are close together". He contrasted this with "the STC rooms that were a bit more spaced out and the tables were easier to reach".

A teacher (with 24 students in 4.03) added that "it was impossible for [her] to get to the back of the room without asking students to stand up". As we observed and she explained "to reach a student with a question she needed to move people around and it created even more distractions". Finally, a lecturer (with 13 students in 4.03) concluded that "her seminars were more interactive when she taught in STC" because she "could easily move around to help without the students asking".

A few students also commented on this issue. One student from a class of 11 in 4.01 wrote that the "size

of the room was just about right for the class". Another student, this time from a class of 13 in 4.03, wrote that if he/she could change something about the room, he/she would put "fewer people" in 4.03. Finally, according to the word cloud created using the adjectives students used to describe the room (survey question 1), the most used word was "crowded".

Lines of Sight

Several teachers also commented on the lines of sight in all three TW2 PC rooms. Three lecturers explained that "students can't see the board because their PC screens are in the way" (4.01), "the computer screens act as barriers between the students and the teacher" (4.02) and "students cannot watch something on their PC screen and see the board at the same time (4.03). These comments back up one of our observation, namely that students in all three rooms had to turn away from their PCs to see the board.

In other instances (11 students 4.01), we noticed that some students had to move across the room to see the board. The teacher verified our observation and told us that "it was hard to see the stage from the left of the room" but "students hadn't complained because the class wasn't full and they could move around".

We also observed that, when the students could not sit somewhere else, they would stand up, look at the screen and go back to their place afterwards. Two lecturers teaching 22 students in 4.02 and 13 students in 4.03 confirmed our finding. One of the teachers added that "in a row layout like STC.018 […] the lines of sight were clearer".

Finally some teachers commented on the fact that "in TW2 rooms some students had to turn around to see the board". Indeed, as we observed, students sitting on one side of the round tables had their back to the board. One teacher explained "that [she] would like tables that face the front so students can compare what's on their screen and the board". In addition, we observed that in TW2.4.03 some students where too close to the screen to see properly when they did manage to turn around.

The students' feedback is consistent with our observations and the teachers' comments. One student in 4.01 wrote that is "hard to see the front from some angles" as "the board is covered by monitors" thus "you have to strain your neck at some seats all lesson". Another, also in 4.01, claimed that the "computers and tables are too high" hence "you can't see the bottom of board without standing up". A student in 4.03 made a similar comment explaining that "it is difficult to see the bottom of the screen from the back of the room". The same student suggested that "maybe the screen should be a little higher so that everybody in the room can see the whole screen". Finally some students in 4.01, when asked about what they dislike about the room, answered that "some seats are not facing the front".

Lectern

Lecturers in all three rooms had two issues with the teaching podiums. First they found them "tiny", they said that "there wasn't enough space to use the mouse and the keyboard properly" let alone "put a book or a handout on there". They explained that the "cables were on [their] paths and kept tripping [them] up". Furthermore, according to all three interviewees the "cords were too short and restrained the podium's mobility".

Ventilation, Light & Acoustics

Both teachers and students commented on the temperature and ventilation in the three TW2 rooms. One lecturer stated that "the biggest problem in those rooms is that they are too hot". Two teachers added that "most of the time they keep the door open to get some fresh air" but "sometimes have to shut it because of the noise in the corridor". Students also commented on the heat in TW2. As our word cloud shows 'hot' and 'warm' were two of the most used adjectives used to describe the rooms. When asked about what they dislike about the room students said that 'the air isn't fresh" (4.01), "the temperature is too high" (4.02) and "it's soooo warm" (4.03).

Comments relating to the lighting were more positive. Indeed, one teacher stated that compared to the STC rooms, TW2.4.02 was "brighter and [he] thought that was great". According to our word cloud, students have also used the word 'bright' often to describe the rooms.

Finally, one teacher commented on the acoustics in 4.02. He explained that "in the towers you get a humming sound which might impact the students' focus". He concluded by saying that "acoustics are sharper in St Clements".

07

discussion

"reducing external distractions is key for teaching and learning"

OLD

Room Layout & Intimacy

The analysis of interview comments revealed that lecturers agreed that the room provided a relatively intimate learning experience. Indeed, all teachers agreed that the layout enabled them to talk to students more easily as they were closer than in deeper, more traditional lecture halls. Some also added that they felt students to be more engaged probably because they could see all of them. Indeed, as one lecturer phrased it "students are more engaged if they feel the lecturer can look at them". The points above suggest that the aim of creating a layout where teachers feel close to the students and vice-versa has been met. Such a design seems to have created an intimate environment where students are more engaged.

Several teachers and students however added that the room could have been even more intimate if the seats surrounded the lecturer a little more. Indeed, students explained that when they sat on the sides of the room they felt a bit far away from the teacher. The original, but abandoned design for the room where seats were in a semi-circular, two-tiered arrangement could have helped solve this issue. The initial layout for OLD would probably have created an even more intimate atmosphere where students and teachers felt closer together.

Our findings show that several lecturers appreciated the fact that the layout of the room enabled them to move around. According to one of our interviewees, being able to move gave the students better lines of sight to the board and himself.

It is also important to note that one lecturer could not get hold of a wireless microphone and thus had to stay behind the podium microphone. He felt that he could not use the room to its full potential as the layout was movement-friendly yet he was stuck at the lectern. The room is now equipped with a working wireless microphone.

Finally, the teachers' and students' opinions about the lack of tiered seating appeared to be divided. Lecturers appreciated the absence of tiered seating as it allowed them to see all the students at a glance. This is not the case in certain lecture halls where those seating at the back are too high up for the teacher to see. The absence of tiered seating thus seems to contribute to the intimate atmosphere and student engagement mentioned above. Several students on the other hand complained about the absence of tiered seating, explaining that they could not see too well from the back of the room. This could undermine the original design intention of providing good sightlines from all parts of the room. The absence of tiered seating thus appears to create a tension between creating intimacy and hindering lines of sight. This might be worth investigating further ahead of future classroom designs. Indeed the original design featured slightly raised back row seating which may have addressed this issue.

Tables, Chairs & Lectern

Our findings show that both students and teachers praised the room's comfortable seats and large desk space. Most surveyed and interviewed also thought that the OLD seating arrangement was more convenient than the STC chairs with integrated tablets. The intention to provide students with comfortable seating and increase writing space thus seems to have been met. The OLD padded furniture also had an unintended positive effect. Indeed, teachers explained that it reduced noise disturbance especially when latecomers enter the room. The limited disruption allows the lecturers and students to stay focused thus improving the overall teaching and learning experience.

As we saw, some teachers thought that the teaching podium was too small. As a consequence, they had to put some of their belongings on one of the front row tables blocking some lines of sight. Although this was not a frequently mentioned issue, it might still be worth keeping in mind when choosing room furniture. Indeed, having a coat hook or a small table against one of the walls could solve this problem.

Whiteboards & Screens

As our findings show, teachers commented extensively on the OLD whiteboards. Lecturers praised their size and height especially compared to the small mobile boards in some LSE rooms. Teachers however regretted that the screens and the board could not be used simultaneously (image). This impacted on the teaching experience as lecturers were not able to project questions on the screen and go through them on the board. This issue should probably be considered when designing future classrooms.

Teachers and students also pointed to a disadvantage of having two boards and screens. Interview comments, survey feedback and our observations show that often, with big class sizes, lecturers do something on one side of the room that students on the other cannot see. Teachers tend to use the left board/screen more often as they are slightly closer to the lectern. In small lectures this is not an issue as all pupils are able to sit on the left side of the room. In bigger courses, which OLD.4.10 is intended for, some students sitting on the right cannot see the teacher's demonstration on the left board or screen. The students sitting in that zone might thus feel less included and engaged in the lecture. This seems to go against the design intention of providing good sightlines from all sides of the room. It is also important to note that, again, the initial design for the space would probably not have engendered such issues. Indeed, with a central stage and a semi-circular seating arrangement all students would have been able to see the lecturer, board and screens clearly.

Room Location

Our study shows that the teachers and students were not bothered by the smell or noise from the cafeteria even around lunch time. This suggests that design challenges pertaining to external disturbances have been successfully addressed. In other words, the noise mitigation doors/partitions and secondary glazing worked well. As Graetz and Goliber concluded, reducing external distractions is key for teaching and learning as students and teachers in the room are able to fully focus on the lecture.

PAR

Small Group Work

As we can see from our findings, teachers and students agreed that the new PAR rooms facilitated small group work within a large seminar/lecture setting. The intention to create a space suitable for small to medium-size group work thus seem to have been met. Linking to this point the room design was also praised as it provided a communicative environment. This was one of the intended effects of the plectrum table layout and reinforces a common finding of other studies. Indeed, both Wilson & Randall and Andrew & Powell also concluded that this type of layout was particularly suited to communicative and collaborative learning tasks. Moreover, most interviewed and surveyed agree that the PAR rooms allowed, as intended, to easily switch from lecturing to group work. Unlike traditional row arrangements, the plectrum tables were said to reflect real life speaking situations and foster active learning. Again this corroborates Andrew & Powell's finding that such layouts enable seamless moves from teacher-led to more active student-centred learning.

Both students and teachers also agreed that the PAR layout enabled student-to-student support. Indeed, teachers observed a lot of group support and survey free text comments praised peer bonding. These positive comments suggest the room design was successful in fostering peer learning, a necessary component of the case method of instruction. Our findings thus seem to confirm Wilson & Randall's conclusion that this type of layout encourages organic group membership and support.

Thirdly our findings suggest that PAR rooms have a high 'attitude impact'. Graetz and Goliber defined attitude impact as the different emotional responses staff and students experience when confronted to different types of learning spaces (i.e. rows suggest lectures, scattered tables suggest collaboration – see literature review). In our case, the PAR layout's attitude impact seem to have been strong enough to make lecturers reflect on their teaching. Picking up on the intended flexibility of the space one teacher expressed a desire to have more seminars in PAR (rather than lectures) in order to do mixed style teaching. Another lecturer, commenting on the plectrum tables, thought she would like to do more group discussion instead of whole class discussion. However, she added that she only had 10 students in her class thus splitting them into smaller groups might be unnecessary. Seconding Jessop et Al's suggestion, this feedback might be worth taking into account when scheduling courses in PAR. Indeed, from these comments it seems that PAR is more suited for mixed style teaching with larger cohorts.

Informality

As we have seen, the PAR layout appears to have successfully created a collaborative environment that encourages bonding and discussion. Consequently, teachers and students have praised the relaxed and informal feel of the rooms. Most surveyed and interviewed felt that PAR rooms were more inclusive and friendlier than traditional row layouts. Our findings are thus in line with Wilson and Randall's conclusion that plectrum tables create a sense of informality that fosters discussion and facilitates peer-learning.

Movement, Monitoring and Lines of Sight

Teachers also praised the PAR layout as it enables them to move around and direct their classes better. This point was controlled for, meaning that the teacher we observed moved around more in PAR than NAB.1.14 while delivering the same class and content. This was contrasted with row layouts where lecturers cannot circulate easily and can only observe what the students at the end of the rows are doing. Again our findings corroborate Jessop et Al's conclusion that traditional row layouts' narrow walkways constrain the teachers' movements and hinder the observation of group work. By contrast the PAR room design was successful in facilitating circulation around the space and consequently group work.

One of the main issues faced by the students in PAR has to do with lines of sight. Indeed, our findings show that some seats are not facing the central stage thus students cannot see the screen or lecturer. This happens when some plectrum tables are displaced with their edges facing the wrong way (images & plan). Comparing our findings with the rooms' intended layout we can clearly see that this situation only occurs when/if the tables are turned. Furthermore, displaced tables made circulation around the room harder (sketches). Perhaps, this could be fed back to facilities management to ensure that tables are placed in their intended position at the end of each day.

Space

Our findings revealed that two teachers felt that their students in PAR were quite spaced out. They mentioned that it was sometimes hard to talk to and integrate everyone when they sat this far away. Although this was not mentioned in the student surveys, it could still have impacted the learning experience in this room. It is important to note however that these two lecturers taught groups of 15 and 16 students in a space that can hold 60. Unless instructed otherwise, students could indeed be quite spread across the room. The cohort size might thus be worth keeping in mind when timetabling courses in PAR.

Students and teachers also commented on the fact that PAR rooms are not very well adapted for whole class discussion. The intention behind the PAR layout however was not to create a space suitable for whole class discussion but to favour mixed style lecturing and small group work. Again this might be worth keeping in mind when timetabling courses in PAR. Perhaps large courses with numerous students should be prioritized especially if the teacher is likely to use a mixed style approach.

Some students regretted that the tables could not be grouped together to have larger group conversations. By larger group, students do not mean full class discussion of 56-60 but conversations of 10 to 12. To address this issue it might be worth looking into plectrum tables with one flat side so that two tables could be grouped together (see image).

Whiteboards & Screens

Our findings show that the teachers and students had different views on the dual projection screens. Some teachers found it hard to orient themselves not knowing which screen to go to when presenting. They also thought that having two screens divided the students' attention. Students, as opposed to what the teachers thought, praised the dual projectors stating that it made it easier to see the teacher's slides. The PAR layout, in that regard, seem to have successfully met its aim of providing students with clear sightlines to the projector displays.

Ventilation, Noise and Light

Teachers and students all mentioned the lack of climate control in the rooms. Most surveyed and interviewed stated that the PAR rooms were humid, stuffy and 'un-fresh'. This seems to go against the initial intention of ensuring the room is naturally ventilated. As Graetz and Goliber explain, high temperatures and bad ventilation can reduce student focus and alertness. It might thus be worth feeding this back to the estates department ahead of future developments.

Teachers and students also complained about the noise level in PAR rooms. They explained that they could not open the windows because there was too much noise outside (in turn impacting the temperature in the room). Furthermore, a few teachers commented on the noise coming from the corridors. This could be addressed by putting signs in the corridors to make sure students waiting outside the PAR rooms are not too loud.

Finally, teachers and students seemed to appreciate the brightness of the room. One teacher even stated that the high ceiling helped her morale. In that respect, the intention to create a bright décor seems to have been met.

TW2

Layout & Group Work

Our findings have shown that some teachers and students appreciated the TW2 circular tables because they encouraged group work. One lecturer even emphasized the "attitude impact"

of the layout (Graetz & Goliber, 2002). Indeed, he explained that as soon as students enter the room they know what is expected of them. The layout encourages collaboration and reduces the students' anxiety levels as they know they will work with their classmates. The layout thus seems to have been successful in creating an environment that suggests collaboration.

Several teachers however regretted that, in practice, the position of the computer screens made group work difficult. Indeed, the screens act as a partition, blocking interactions across the tables (image). Teachers explained that, as a result, students ended-up collaborating mainly with the students adjacent just like they would in a row layout. Often, students had to move slightly to see their neighbours' PCs because of the way the screens were angled around the circular tables. Some students also stood up and went around the tables to help and talk to their peers. The position of the screens thus seems to go against one of the initial design intentions, namely to create a room that enables students to work in groups. Wilson and Randall (2012) arrived to a similar conclusion noting that the obtrusiveness of computer screens made collaboration difficult. Perhaps having the screens 'sunk-in' the tables – as was initially planned but abandoned for cost reasons – would help with this issue.

It must also be noted that the layout did not hinder individual work. Indeed, teachers who conducted classes where students worked mainly on their own were satisfied. Had the screens not made collaboration difficult, the layout would have successfully enabled students to work individually and in groups.

Monitoring

Our findings show that several teachers thought the layout enabled them to better monitor students. Interviewees explained that they could see what the students were doing when they went through the class. They also added that unlike the STC rooms, students in TW2 were clustered around the centre which made communication to the whole class easier. It is key to note that only teachers who taught small groups (10-12 students in rooms that can hold up to 24-30) made such positive comments. We can thus see that teachers with small cohorts were able to move, monitor and communicate with students easily.

Movement

Teachers with bigger cohorts however stated that they had trouble moving around the rooms. One lecturer explained that as soon as you had students sitting at every table it became hard to circulate. Several teachers and students added that it was difficult to move around as the tables were too close together. In that regard the STC rooms were deemed more comfortable as the tables were spaced out and easier to reach. Teachers added that, in TW2, to reach students with a question they sometimes had to move people around distracting the rest of the class. Moreover, 'crowded' was the most used word by the students to describe their first impression of the rooms. All of this seems to suggest that, in classes with a large number of students, the space did not allow teachers to easily move around. This impacted on teaching and learning as lecturers could not help their students as easily as they wished. It also created distractions as teachers moved people around shifting the students'

focus away from the exercise. This issue could perhaps be addressed by implementing such a layout in bigger physical spaces.

Lines of Sight

Our findings show that students had a hard time seeing the board because their computer screens were in the way. In a few cases students stuck their necks out to glance over their PC screens. They seemed unaware of the fact that they could adjust the height of the individual screens. More often, we observed that students would stand up, look at the projector screen and go back to their place afterwards. This created distractions that could shift some students' attention away from their work. This suggests that the computer screens' position obstructed the sightlines from the seats to the projector screens. Again, this issue could be addressed by slightly sinking the screens into the tables.

In the TW2 rooms some students had to turn around to see the projector screen as their seats were not facing the right way (image). In addition, we observed that in 4.03 some students were too close to the screen to see properly even when they managed to turn around (image). Again this became a real issue when the classroom was full and the students could not relocate to a seat with better sightlines. Teachers also added that the sightlines to the board were clearer in row layouts. This suggests that the TW2 layout was not too good at maintaining sightlines from the seats to the projector screen. Perhaps having two projectors screens, one on each side of the room could help with this issue. Furthermore, had the space in 4.03 been bigger, tables could have been placed further away

from the projector screen ensuring better sightlines.

Lectern

Our study has found that teachers were quite negative about the lectern. Indeed, they found the podium too small to use the keyboard and mouse properly, let alone put a book or handout on it. They also added that the cables were too short and restrained the podium's mobility. One teacher also complained that the cables were in his path and kept tripping him up. These remarks should also be kept in mind when designing future rooms. Perhaps if the space being designed were bigger it would be worth including a slightly bigger podium.

Ventilation & Light

Both students and teachers have complained about the temperature and ventilation in the TW2 rooms. Students have frequently used the words 'hot' and 'warm' to describe their initial thoughts about the rooms. Teachers explained that they tried to keep the door open as much as they could but often had to shut it due the noise in the corridor. Lack of ventilation and high temperature, as we previously noted, impact teaching and learning as they might reduce student focus and alertness. These climate control issues should thus be fed back to the estates department ahead of future developments.

Comments relating to the lighting were more positive. Indeed, compared to the STC rooms, teachers and students praised the 'brightness' of TW2 rooms. Again this is an important point to highlight as the same lighting and colour scheme could be applied in the future.

08

conclusions

Using qualitative research techniques, our report aimed to evaluate how the redesigned OLD, PAR and TW2 PC rooms influenced teaching and learning. Following Andrews and Powell's conclusion that "successful planning is a collaborative process and not a template applicable to differing spaces" we focused on gathering users' feedback. (2009: 52). We hope, in turn, that this feedback will inform new room designs and that our methodology can be replicated for future evaluations. By way of conclusion we would like to summarize our findings, offer some recommendations and indicate avenues for further research.

OLD

Our findings have shown that the aim of creating a layout where teachers feel close to the students and vice-versa has been met. Such a design seems to have created an intimate environment where students are more engaged. That being said, we were told that the room could have been even more intimate had the seats surrounded the lecturer a little more. We believe that the initial design for the room, abandoned for supplier and cost reasons, could help solve this problem. Indeed, in the original plan for the space, seats were in a semi-circular arrangement closely surrounding the lecturer on a central stage.

We conclude that the intention to provide students with comfortable seating and increased writing space has been met. The padded furniture even had an unintended positive effect. Indeed, it reduced noise disturbance and allowed students and teachers to stay focused on their lecture.

Our study has found that several lecturers appreciated the fact that the layout of the room enabled them to move around. This enhanced the students' lines of sight both to the teacher and the board. To make the most of the movement-friendly layout it must be noted that teachers need access to wireless technology (microphone and remote) to move away from the lectern.

We can confidently say that the teachers and students were not bothered by the smell or noise of the cafeteria even around lunch time. This suggests that the design challenges pertaining to external disturbances

have been successfully addressed. The noise mitigation doors/partitions and secondary glazing worked well, allowing lecturers and students to fully focus on their course.

Our report highlights that the teachers and students' opinion about the lack of tiered seating is divided. Lecturers appreciated the flat layout as it enabled them to see all their students, increasing intimacy and engagement. Students complained about it as they could not see too well from the back rows, clashing with the intention of providing good sightlines from all parts of the room. The absence of tiered seating thus appears to have fostered an intimate atmosphere yet hindered lines of sight. It might be interesting to conduct further research to see if there is any way around this trade-off.

Our study has found that some teachers thought the teaching podium was too small. As we will see below, this has also been the case in the TW2 PC rooms. In OLD, teachers ended-up putting some of their belongings on one of the front row tables blocking some lines of sight. Adding extra storage space or a coat hook against one of the walls could potentially solve this issue.

This report also shows that teachers regretted that screens and boards could not be used simultaneously. This impacted teaching and learning as lecturers were not able to project questions on the screens and go through them on the board. When designing future rooms, it might be worth leaving sufficient whiteboard space next to the projection screen or perhaps include a 'hybrid' device like a smartboard.

Finally, our data revealed that often, with large class sizes some students

sitting on the right could not see the teacher's demonstration on the left board or screen. The students in that zone might thus feel less included and engaged in the lecture. This goes against the intention of providing good sightlines from everywhere in the room. The original design of the room where students sat in a semi-circular arrangement around a central stage would probably not have engendered such issues. It might be worth considering the initial layout planned for OLD for future lecture halls as it would provide an intimate atmosphere where all students can see the board, lecturer and screens clearly.

PAR

Our findings show that the aim of creating a space suitable for small to medium-size group work has been met. Indeed, both teacher and students agreed that the new PAR room facilitated small group work. Our study thus reinforces Andrew and Powell's conclusion that plectrum tables are particularly suited to communicative and collaborative learning tasks. In line with Andrew and Powell's second finding, the PAR layout also enables seamless moves from teacher-led to more student-centered learning.

Our report highlights that the room design encouraged peer-learning. This reinforces Wilson and Randall's conclusion that this type of layout encourages organic group membership and student-to-student support. This also suggests that the PAR layout was successful in creating an atmosphere suitable for the case method of instruction.

We conclude that the PAR layout's attitude impact has been strong enough to make lecturers reflect on their teaching. Picking-up on the intended flexibility of the space one teacher hoped to do more mixed style teaching than lectures in PAR in the future. Another lecturer, reflecting on the plectrum tables, thought she would like to do more group discussion instead of whole class conversations. Unfortunately, she only had 10 students in her class thus splitting them into small groups was unnecessary. Now we know from Jessop et al that managing flexible spaces presents challenges to the point where room booking officers have described the complexity of room allocation using the image of a Rubik's cube. However, according to our data, it seems like large courses with an emphasis on mixed style teaching should have scheduling priority in PAR.

Our study shows that teachers and students have praised the relaxed and informal feel of the rooms. Plectrum tables were judged friendlier and more inclusive than traditional row layouts. This reinforces Wilson and Randall's conclusion that plectrum tables create a sense of informality that fosters discussion and peer learning.

Our findings also revealed that the PAR layout enables teachers to move around and direct their classes better. Again plectrum tables were contrasted with row layouts

where narrow walkways constrain movement hence observation. The PAR layout thus met its aim of enabling easy circulation.

We have seen that teachers and students had different views on the dual projector displays. Some teachers thought that having two screens divided the students' attention. Students, as opposed to what their lecturers thought, praised dual projection because it made it easier to view the slides. The PAR layout, in that regard, met its aim of providing clear sightlines to the projector screens.

We have found that some students regretted that the PAR tables could not be grouped together to have larger group conversations. Larger groups do not refer to full class discussion (56-60 students) but conversations of 10-12 students. To address this it might be worth looking into plectrum tables with one flat side so that two tables could be grouped together.

Our data shows that issues arose when tables were displaced. Indeed, when the edges of the tables faced the wrong way some seats no longer faced the central stage. In this case, some students lost clear line of sight to the screens and lecturers. Furthermore, we observed that displaced tables made circulation around the room harder. Perhaps we should inform lecturers of the importance of putting the tables

back in their original position after they finish teaching. Our findings could also be fed back to facilities management to ensure that tables are placed in their intended position at the end of each day.

Our interviews revealed that a few teachers thought that their students in PAR were too spaced out. It must be noted however that these lecturers taught groups of about 15 students in a room that can hold 60. In this case, if the students are not instructed otherwise, they can indeed be quite spread-out. Again, where and if possible, cohort size should be kept in mind when timetabling courses in PAR.

Finally, our findings show that most of those surveyed and interviewed regretted the noise and lack of ventilation in PAR. The space was described as stuffy and humid, going against the initial intention of having a naturally ventilated room. Furthermore, teachers and students explained that they could not open the windows or doors because it was too noisy outside and in the corridor. Noise coming from the corridor could be reduced by putting signs up to make sure that students waiting outside the room are not too loud. Issues regarding ventilation and exterior noise should be fed back to the estates department to ensure that future classes and lecture halls provide an optimal environment for teaching and learning.

TW2

Our findings show that the TW2 layout suggests collaboration. One teacher explained for instance that as soon as students enter the room they know what is expected of them. The round tables send a clear message to the students, namely that the course is likely to involve collaboration.

In practice however, we found that the position of the computer screens made group work difficult. The screens block cross-table interactions and students end-up interacting mainly with the students adjacent like they would in a row layout. The position of the screens, just like Wilson and Randall observed, go against the initial design intention of creating a room that enables group work. Perhaps having 'sunk-in' screens, as was initially planned but abandoned for cost reasons, would solve this issue.

Furthermore, our study shows that the layout did not hinder individual work. Indeed, lecturers who taught individual-work based classes were satisfied. We can thus conclude that, had the position of the screens not made collaboration difficult, the layout would have successfully enabled both individual and group work.

Our report highlights that teachers with small cohorts were able to move, monitor and communicate with students easily. We observed that lecturers with 10-12 students (room's maximum capacity: 24-30 students) found it easy to circulate around the room. Teachers with small cohorts also thought it was easier to move and thus monitor students in TW2 that with traditional row layouts.

Our findings show however that teachers with bigger cohorts had trouble moving around the rooms. Compared to the STC rooms, they explained that tables in TW2 were too close together and they thus had difficulty moving around. This became a major issue as the teachers could not help their students as easily as they wished. The only way to address this issue is to implement such a layout in bigger physical spaces.

We have also found that students had a hard time seeing the board because their computer screens were in the way. In a few cases students stuck their necks out to slightly glance over their screens. This could be resolved if students were made aware that they can adjust the height

of individual screens. More often however, we observed students who would stand up, look at the projector screen and go back to their place afterwards. This suggests that computer screens obstructed some sightlines from the seats to the screens. Again, this issue could be addressed by sinking the screens into the tables.

Our study has shown that, in TW2, some students had to turn around to see the projector screens as their seats were not facing the right way. In room 4.03, some students were too close to the screens to see properly even when they managed to turn around. This suggests that the TW2 layout did not allow for good sightlines from the seats to the projector screens. Perhaps having two projector screens, one on each side of the room could solve this problem. Moreover, had the space in 4.03 been bigger, tables could have been placed further away from the projector screens to ensure better sightlines. Alternatively removing tables from the room would solve this issue but also reduce the overall capacity of the space.

Our findings show that teachers were quite negative about the lectern. They complained that the podium was too small to use the keyboard and mouse properly, let alone put a book on it. They also added that the cables were too short and restrained the podium's mobility. We have considered two possible solutions to address this issue. The first would be allocating one of the student's PCs to the teachers. The other would be installing a bigger podium but that would reduce the room's capacity further. We believe this issue should be explored further.

Finally, both students and teachers have complained about the temperature and ventilation in the TW2 rooms. As is the case with PAR, these climate control issues should be fed back to the estates department ahead of future developments. Comments relating to the lighting were more positive. Indeed, compared to the STC rooms, teachers and students praised the brightness of the TW2 rooms. This is a good point to bear in mind ahead of future developments as the same lighting and color scheme could be applied in the future.

09

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10

appendix

Appendix 1: Teachers' Interview Questions

1. How has the use of the room impacted on the way you teach this subject?

2. How has the use of this space impacted on your role as a teacher?

3. What types of learning activities do you find this space has facilitated well?

4. What do you perceive as the impact this space has had on the student's experience of learning?

5. What would you add/change/remove from the current room and why?

6. Intentions behind room design: how much do you agree with this?

7. What have been the differences, if any, between the way you used this space and other spaces where you have taught a similar class/seminar/lecture/workshop?

Parish Hall

Parish Hall was transformed into three large teaching rooms, seating 60 people in a cabaret style arrangement with large and small plectrum tables designed to encourage groups to both interact with the academic and with each other. Power is provided all the way around the room to allow students to plug in their own devices, further facilitating interaction and connectivity. Large projections screens provide clear, unimpeded viewing through the room. These are inspiring teaching spaces, especially the top floor with a grand vaulted ceiling revealing the heritage of the building. These rooms have been designed to provide the teacher and student with clear sight lines, an opportunity to be interactive across a wide variety of teaching modes and well lit spaces that create a bright, welcoming space.

Tower 2 4th Floor Collaborative Computer Rooms

These rooms are designed to transform the learning experience for computer-led courses. Turning the traditional rows of a computer on its head, these rooms put students in a circle where they can not only interact with the person next to them, but all across the table, facilitating discussion and debate. The teaching podium has s significantly reduced footprint and is mobile allowing the teacher the opportunity to use multiple platforms including whiteboards as part of their delivery. The colours in the room are bright and contemporary. Each table has a rounded plug for students to recharge their own devices.

OLD.4.10

Transforming what used to the Beavers Retreat Bar and lately, an overflow dining facility, the intention for this room was to provide for an intimate but large group teaching and learning experience. Every learner sits on the same flat level but through the arrowhead formation is in close proximity to a large projection screen as well as being in the circle surrounding the lecturer. There are spaces for students with disabilities and an induction loop for those requiring enhanced hearing support. The teaching podium has a reduced footprint in order to provide the students with clearer lines of site. The colours in the room are set to provide a contemporary, organic feel to the space that brings the outside into the room. The room is large, bright and spacious but keeps delivering an intimate learning experience.

Appendix 2: Student Interview Questions

Learning Spaces – Student Feedback

The Learning Technology and Innovation (LTI) team is interested in gathering your feedback regarding the impact of room design on your learning experience.

Room

1. What three adjectives would you use to describe the room?

2. What do you like about the room?

3. What do you dislike about the room?

4. What would you add/change/remove from the room and why?

If you are happy for us to contact you regarding your feedback please provide us with your LSE email address.

Email address:

Appendix 3: Room Plans

OLD.4.10
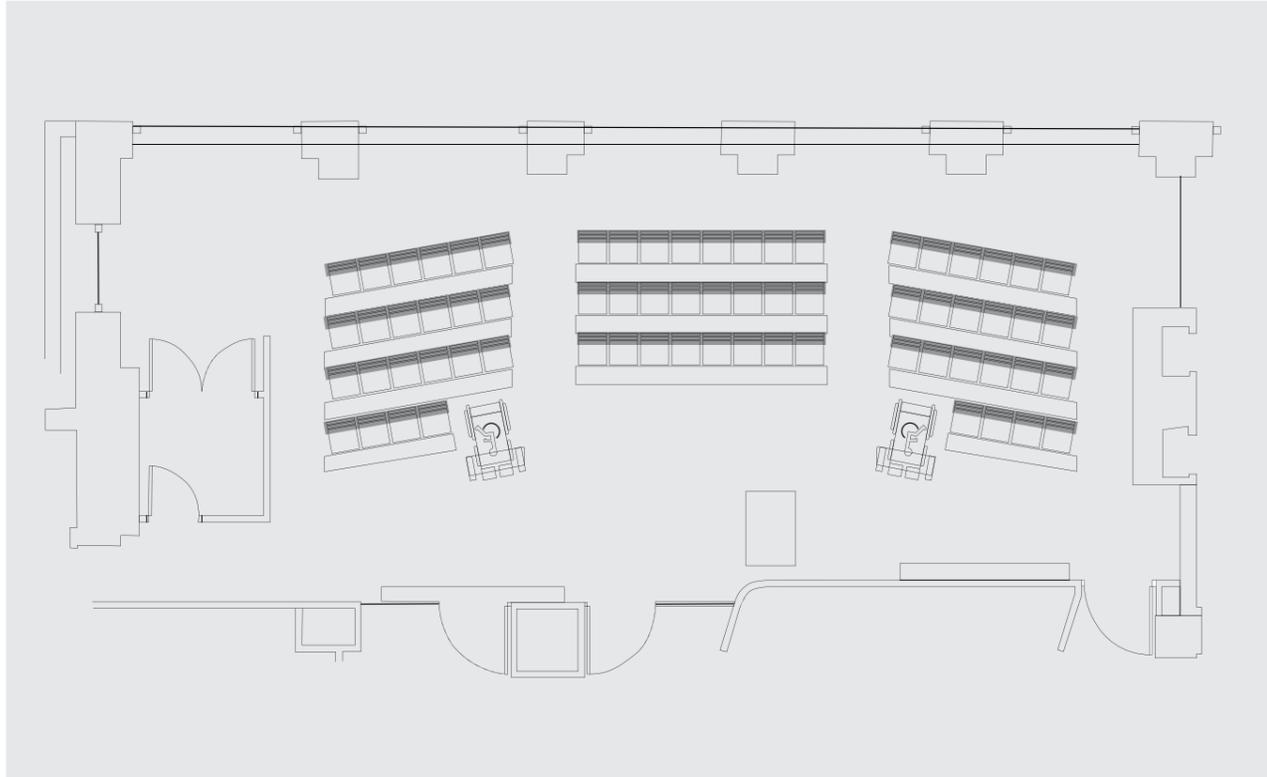
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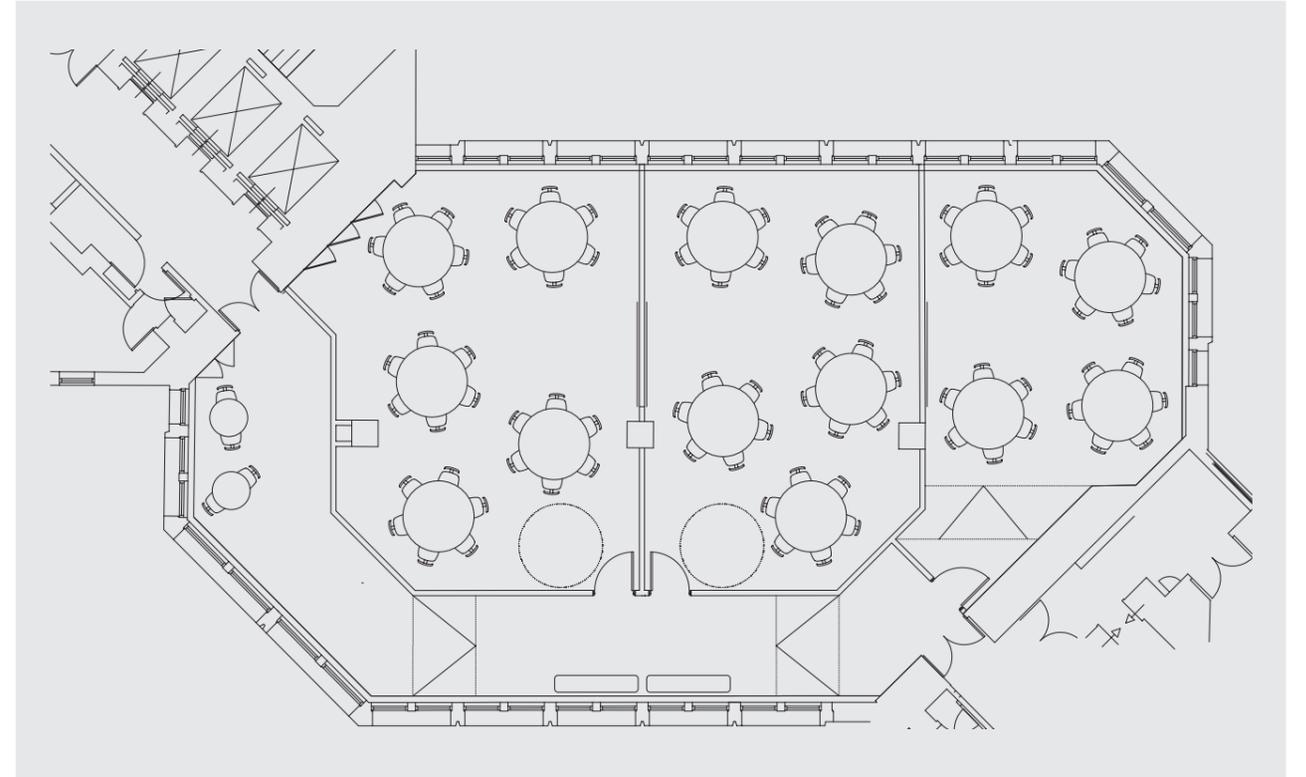
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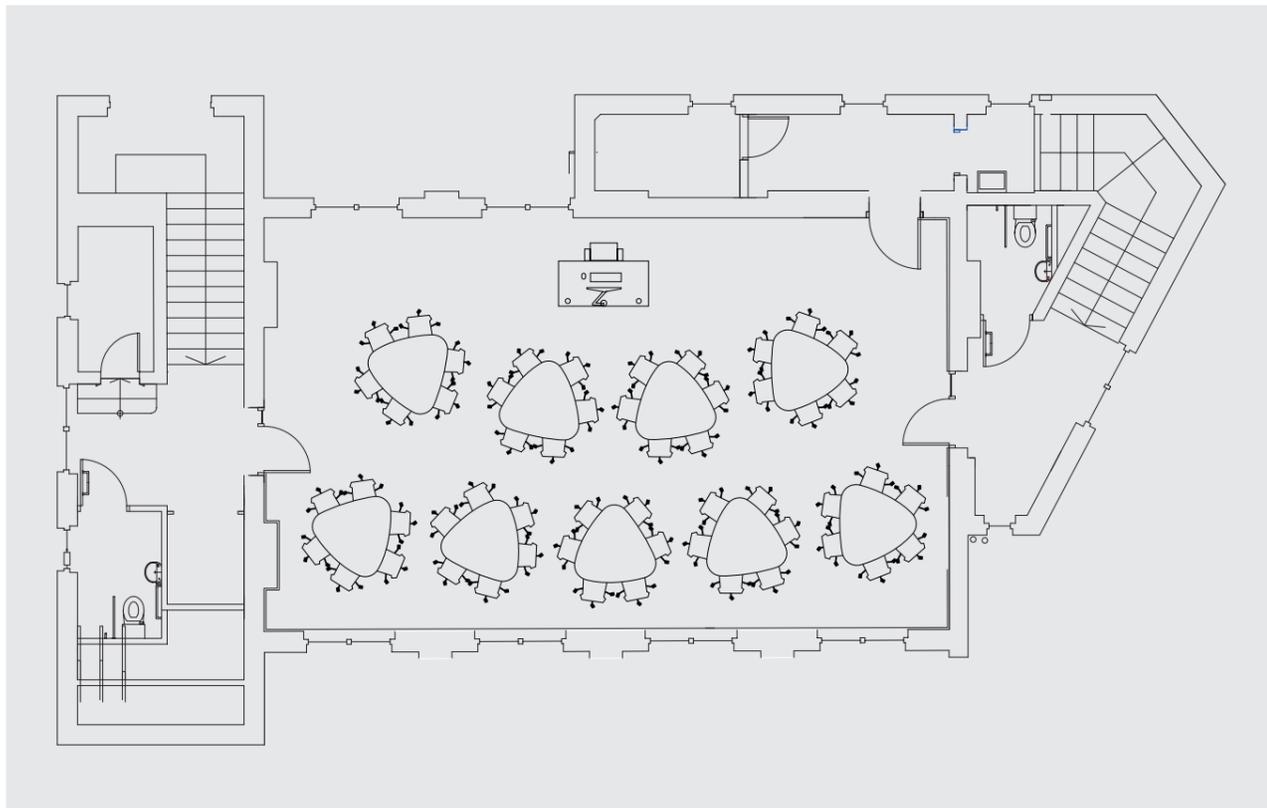
Project Leader: Kris Roger
Research Design: Sarah Ney
Researcher: Laurent Liote

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