How do spaces for learning and teaching impact upon the achievement of small group learning outcomes? A student perspective at the University of Sheffield, UK.

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Summary

The importance of active participation by students in their learning is now accepted by many in education. This project explored how students perceive learning and teaching spaces to influence their learning outcomes, specifically for small group activities. Using survey and focus groups, Student Associates for Learning and Teaching (SALTs) harnessed student opinions in a UK University's Faculty of Medicine Dentistry and Health. This work resulted in the generation of recommendations, which will engage student opinion for future development of learning and teaching spaces.

Background

Active learning is a process which requires students to engage in higher-order cognitive processes, such as analysis, synthesis and evaluation, rather than solely listening (Bonwell & Eison, 1991). Adopting an active learning approach to teach traditionally lecture-based subjects has been the subject of much interest in higher education, particularly within the last decade.

Encouraging students to take an active role in the classroom includes both student-student and student-teacher interaction (Stoltzfus & Libarkin, 2016). In fact, reduction in passive learning vs active learning has been shown to improve both student exam performance and student satisfaction (Hacisalihoglu et al, 2018). This may be because active learning encourages processing of ideas, more so than listening alone (Hodges, 2018).

Strategies to encourage active learning include the flipped classroom model,

in which students are introduced to the material in their own time via, for example, videos or written material. Classroom time is then used for discussion and collaborative learning (Gillispie V, 2016). Evidence for the effectiveness of the flipped classroom is found in studies such as that by Nouri et al. (2016) which shows that a majority of students had a positive experience. In addition, positive attitudes to flipped learning were "strongly correlated to perceptions of increased motivation, engagement, increased learning, and effective learning".

The learning space is a key environmental factor for the successful achievement of learning outcomes by students. Brown and Long (2006) contend that recent trends in learning space design have resulted from "a constructivist learning paradigm", focusing on learning rather than teaching. There is emphasis on human-centred design which supports active learning strategies, e.g. the shift from information commons towards learning commons. There is also increased support for devices which enrich learning.

Adaptable learning spaces are a part of these trends, where the ability to reconfigure a space makes it possible to modify interactions between teachers and learners to increase opportunities for active learning. For example, the "SCALE-UP" (Student Centred Active Learning Environment with Upside-down Pedagogies) classroom has been shown to improve outcomes for the flipped classroom model (Hacisalihoglu et al, 2018; Stoltzfus & Libarkin, 2016). In a SCALE-UP classroom, students are positioned in small groups on round tables, with strategically positioned computers, whiteboards and/or easels. Students engage in collaborative learning activities, based on pre-class material which they have studied in advance. A 2018 study demonstrated a 16% increase in pass rates, along with improved student perception of learning gains (Hacisalihoglu et al, 2018).

The Spaces for Knowledge Generation project consisted of a partnership between La Trobe University (Lead institution), Charles Sturt University, Kneeler Design Architects and Apple Inc. The team concluded that

"learning spaces which invite students to take charge of the

configurations of their working environment [...] help to produce an engaged and considerate community of learners". (Souter et al, 2011, p. 1).

In spite of this, they also found that student-driven design is generally lacking. A study in Australia on the evaluation of learning spaces (Lee & Tan, 2011) found that the design of learning spaces is generally not discussed with students until post-build and occupation.

One of the key messages of the Spaces for Knowledge Generation project was that student input is essential to develop spaces which account for the modes of learning of all users. Students often have experience of several learning spaces and teaching techniques within their course of study. Student experience/input is identified as one of nine key factors in the design for active and collaborative learning (Souter et al, 2011).

The University of Sheffield developed an updated vision for learning and teaching spaces in March 2017, aligned to the Learning and Teaching Strategy 2016-2021 (The University of Sheffield, 2016). Aims were to create and maintain a world-class learning environment that reflects a blend of physical and virtual spaces and to support the highest quality education and student learning experience. Realisation of this vision is multifactorial. To pilot the involvement of students in the university's vision, the Faculty of Medicine Dentistry and Health engaged Student Associates for Learning and Teaching (SALTs) (Student Engagement at The University of Sheffield, n.d.) to research and identify student perceptions of current and ideal learning spaces across the Faculty, with the potential to involve students in future consultation on space provision more broadly across the university.

Description of the project

A general outline of the project was produced by three members of academic and professional services support staff from the faculty of Medicine, Dentistry and Health. The SALT team consisted of six students, from different departments across the faculty. The team was selected through a rigorous

interview process where the project outline was presented, and candidates discussed ideas for implementation. Successful candidates were selected based on teamwork skills, leadership and demonstration of original and practical suggestions. The final project was developed by the SALTs, with guidance and support from the academic and professional services staff.

Initial information gathering was through literature review and discussion with departmental staff regarding the spaces they used for teaching and learning.

Following this, an online questionnaire was sent to all the students in the faculty - all disciplines, levels of study and modes of attendance were included. This survey generated 98 responses (27 male, 69 female, 3 prefer not to say) from a faculty total of 3,832 students (2.5%), and represented all departments across the faculty in relative proportions. Response rate may have been limited by survey invite dissemination during exam time, which was unavoidable due to time restrictions. The survey assessed the appropriateness of current teaching and learning spaces for achieving target learning outcomes across several learning activities: clinical skills development, knowledge transfer (assimilation and retention of facts), case-based discussion, practical workshops, informal group study and seminar group work. Free text sections allowed students to elaborate on their reasons for identifying spaces as supporting or detracting from their learning.

The final stage of the project involved conducting three focus groups, each with eight self-selecting students. The groups were recruited from all departments across the faculty. The same questions were asked to each set of students. Photos of existing local spaces and examples of "innovative" learning spaces from external institutions were used as prompts to stimulate discussion in the focus groups. The aim of the focus groups was to further explore how different types of teaching spaces, rather than environmental factors, impact upon achievement of learning outcomes.

Evidence of effectiveness and impacts

Results

Environmental factors were highlighted as important via the survey. These included quality of IT equipment, better lighting, comfortable furniture, being spacious, having low background noise and good temperature control.

An important emergent theme from the focus groups was that:

> *'An ideal learning space should have the ability to be reconfigured for presentations, discussions and group work'.*

Practical skills teaching spaces were considered the most useful for students' learning gain, whilst traditional classroom style seminar rooms with rows of desks were considered the least useful.

In seminar rooms, circular tables were considered important, to facilitate eye contact and interaction between students. In addition, students reported that rooms should allow for both large and small group learning within the same teaching session. To facilitate this, tables with wheels were considered most useful, for ease of reconfiguration and to ensure a student's position within the room did not affect visibility of visual aids.

In computer rooms, desktop monitors were considered to inhibit interaction and eye contact with other members of the group. A possible solution suggested was the use of tablets or mobile screens which could be moved for interaction.

In practical spaces, more visual aids would be useful as students at the back of the group often have an impeded view if the only visual aid is at the front of the room. In general, computer rooms were seen to be good for private study but not for group work.

Finally, from the photos of innovative spaces, students preferred spaces with several small, preferably oval, tables within a larger room for small and whole group work. They also preferred the option for several screens showing different references at the same time, although wanted the option to turn these on and off as required to prevent distraction.

Recommendations

Findings from the survey and the focus groups were combined to form three practical recommendations which could be realistically adopted. These were presented to the Faculty Learning and Teaching Committee.

Recommendation 1: Easily reconfigurable rooms

The survey identified that a fixed layout of seminar rooms restricted levels of interaction. Focus groups revealed that seminar rooms with tables on wheels were more popular due to ease of reconfiguration.

Students wanted the flexibility to work in different sized groups within the same learning session, along with the option of rapid reconfiguration for private study and group work. Participants did not want to waste valuable teaching time moving furniture but were willing to move it themselves if safe and quick to do so.

Recommendation 2: Multiple visual aids

Focus groups identified that the location of a single screen should not restrict learning and engagement. In light of this, students would prefer multiple visual aids, so choice of seat within a room doesn't affect ability to engage.

This could also be applied to practical spaces where all members of a group may not be able to see a small demonstration. Students suggested that a projection of the demonstration could be displayed on a large screen or on several small ones.

Where several visual aids are available, participants wanted the ability to turn different screens on and off and move whiteboards as required.

Recommendation 3: More innovative spaces

Focus groups identified a desire for rich and engaging learning experiences. To achieve this, oval shaped tables were popular as they facilitate interaction and engagement as everyone around the table can see and communicate with each other. A central focal point within the space was advocated, which allows the tutor to move between whole group teaching and smaller group activities.

In addition to reporting back to the Faculty Learning and Teaching Committee, the outcomes and recommendations from this project were presented to and accepted by the university's Learning, Infrastructure and Space Management Group (LISM) in April 2018. LISM endorsed the SALT recommendations and agreed that these should inform the university's current refurbishment programme for learning and teaching spaces, and that students should be included in refurbishment planning going forward.

Reflections

ER (student project lead): "Constructing a specific title from the generic brief was challenging, however it allowed the student team to direct the project towards an area we felt was important. Working with students from different departments brought diverse experience to the team and allowed us to engage with participants from across the Faculty. I personally enjoyed the opportunity to lead an enthusiastic team. The project facilitated the development of leadership, teamwork and presentation skills outside my chosen degree course. I presented the project in oral and poster sessions at RAISE Conference 2018 at Sheffield Hallam University in September 2018, where we won the conference poster competition, voted for by student members of the RAISE Network Committee.

Recognition of the project by the Faculty and wider University cemented the validity of our work and I feel a personal sense of achievement, having potentially improved the experience of future students.

A potential barrier was accessing the full student body within the faculty. To address this, the team divided to selectively target different student groups. Meeting times were also a challenge, due to widely differing schedules of team members. Detailed minutes were kept and distributed, and we made use of video calling.

Planning, executing and presenting the project within one year was challenging. In hindsight, we would ideally have released the survey earlier in the year and avoiding exam time to increase response rate. Staff focus

groups could have added an interesting viewpoint to the results."

PG (staff): "The initial brief for the SALTs was deliberately generic to allow the team to identify their own project focus. SALTs quickly identified a range of relevant learning and teaching activities to include in their survey, and while many of the respondents highlighted the importance of environmental factors, we encouraged the team to focus more on how other aspects of their learning environments impacted upon their learning outcomes for the focus groups. The three recommendations were arrived at by consensus of the SALT team, who over the few months developed significant insights into the complexity of designing student-centred learning environments both from the literature they researched and the responses they received. Their insights on how the configuration of visual aids either supports or hinders learning were particularly helpful in identifying last-minute recommendations for refurbishment of small seminar rooms in the Medical School. This project provides an important demonstration of the value of partnership between staff and students in identifying key aspects of the design of active learning spaces to positively impact on learning outcomes."

ME (staff): "This project also provides evidence of the value of co-production where staff and students work together as partners to develop educational practice. The project was set-up to be student led and the staff involved were keen that the students took responsibility for its success from the outset. The SALTs were recruited from the academic departments with the Faculty of Medicine, Dentistry and Health and one of their early challenges was to establish themselves as an effective multidisciplinary team. The SALTs met this challenge under the strong leadership of the SALT lead, and by the staff achieving an important balance between challenging the SALTs and providing them with timely advice and practical support."

Conclusion

This project empowered the student voice across the Faculty of Medicine, Dentistry and Health. Three key recommendations were generated, which will shape future teaching and learning space provision at the University of

Sheffield. In turn, this has the potential to vastly improve student learning experience at this university and beyond.

Acknowledgements

References

Bonwell, C. & Eison, J. (1991). Active Learning: Creating Excitement in the Classroom. *1991 ASHE-ERIC Higher Education Reports*. Retrieved from https://eric.ed.gov/?id=ED336049

Brown, M. & Long, P.D. (2006). Trends in Learning Space Design. In D. Oblinger (Ed.), Learning Spaces. Washington, D.C: Educause

Gillispie, V. (2016). Using the flipped classroom to bridge the gap to generation Y. *Ochsner Journal*, *16*(1), 32-36. Retrieved from http://www.ochsnerjournal.org/

Hacisalihoglu, G., Stephens, D., Johnson, L., & Edington, M. (2018). The use of an active learning approach in a SCALE-UP learning space improves academic performance in undergraduate General Biology. *PloS One, 13*(5), e0197916. doi: 10.1371/journal.pone.0197916

Hodges, L. C. (2018). Contemporary issues in group learning in undergraduate science classrooms: A perspective from student engagement. *CBE—Life Sciences Education, 17*(2), es3. doi: 10.1187/cbe.17-11-0239.

Lee, N. & Tan, S. (2011). A comprehensive learning space evaluation model: Final Report 2011. *Australian Learning and Teaching Council*. Retrieved from

https://researchbank.swinburne.edu.au/file/053407e1-dfa4-47c2-9231-659fa674f6fb/1/PDF%20%28Published%20version%29.pdf

Nouri, J. (2016). The flipped classroom: for active, effective and increased learning – especially for low achievers. *International Journal of Educational Technology in Higher Education, 13*(33). doi:10.1186/s41239-016-0032-z

Souter, K., Riddle, M., Sellers, W., & Keppell, M. (2011). Spaces for knowledge generation. Final Report. Retrieved from http://documents.skgproject.com/skg-final-report.pdf

Stoltzfus, J. & Libarkin, J. (2016). Does the room matter? Active learning in traditional and enhanced lecture spaces. *CBE—Life Sciences Education, 15*(4), ar68. doi: 10.1187/cbe.16-03-0126

Student Engagement at the University of Sheffield. Student Associates in Learning and Teaching (SALT). (n.d.). Retrieved from https://www.sheffield.ac.uk/staff/learning-teaching/our-approach

The University of Sheffield. (2016). Learning and Teaching at the University of Sheffield 2016-2021. Retrieved from https://www.sheffield.ac.uk/staff/learning-teaching/our-approach/strategy2016-21