Communicating with the Silent Majority.

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Introduction

Cast your mind back to the lectures you attended as an undergraduate. Then ask yourself these questions. Where did you sit? Why were you sat there? Did you have the confidence to interact? Think about now, as the lecturer. When you ask a question who responds and why? Are you engaging the whole cohort? This case study will demonstrate how student choice of seating locations affects their engagement [1] and details interventions that were introduced to enable anonymous inclusive participation.

Research: Students Choice in Seating Location

Lectures are a central mode of delivery on Bioscience programs, and understanding how students interact within this environment is key to their effectiveness [2]. The format has been criticised as being passive, leading to disengagement by the students [3]. In response, active learning methods have been introduced to increase student interaction and performance [3]. However, little research has been conducted into the reasons why students choose to sit in a given location and how this affects their involvement [4,5]. To address this issue, student comments and attainment were collected and mapped onto the lecture layout (Fig1).

Contrary to the expectations of the lecturing community, core themes emerged from the dataset, with friendship being the predominant reason given for seating choice. Although discrete patterns in attainment relative to the position were not seen, the data showed that the friendship groups obtained similar scores on problem-solving tasks, with clusters of high and low performing groups seated in rows (Fig2). Thematic analysis indicated that a willingness to interact was also a primary reason determining seating choice. Students who identified with wanting to communicate were seated at the front or in central locations. However, students at the back and edges of the room cited anxiety or nerves as a reason for choosing that location and importantly did not want to interact directly.

> *"I read the paper with some preconceptions about a student's seating choice and attainment. This paper has shown that these were incorrect. A big takeaway is the need to make sure individual students are integrated into the lecture."*
> Dr Ian Turner (BTOY winner 2017)

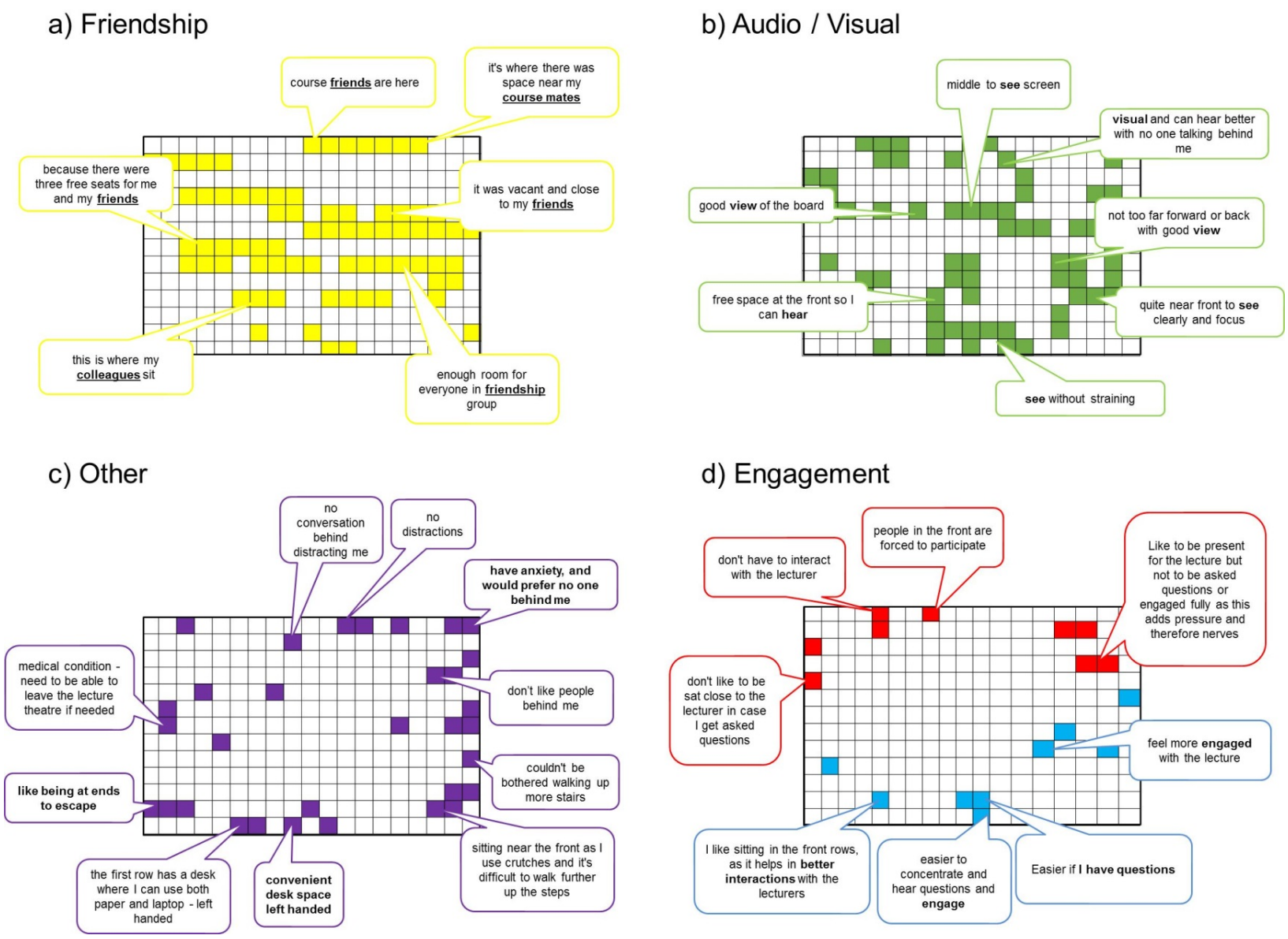


Fig1. Mapping of student comments regarding seating choice onto the lecture space.
(A) Friendship
(B) Audio/Visual preference
(C) Physical and Emotional
(D) Engagement
Image reproduced from [1].

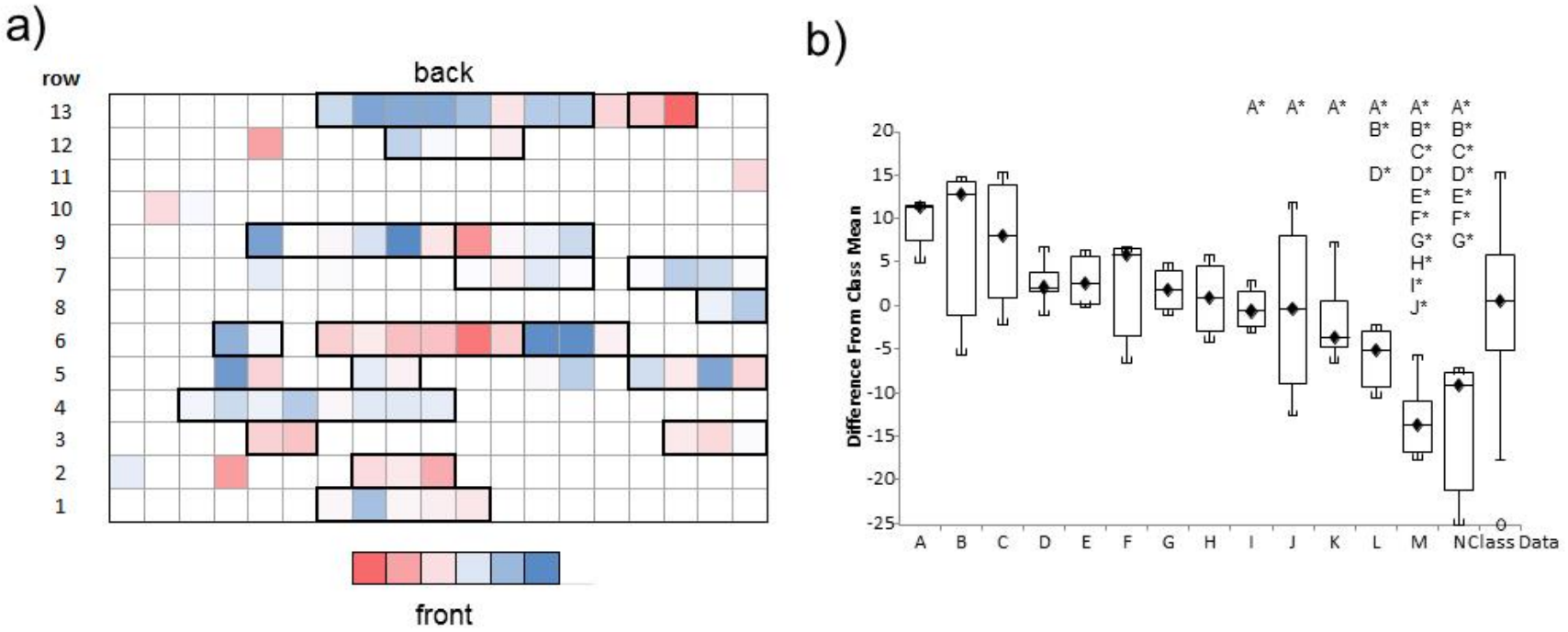
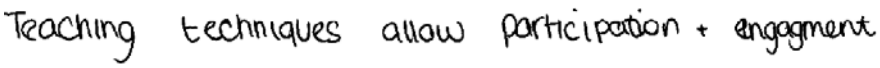


Fig2. Individual attainment for a second-year problem-solving task was mapped onto the lecture space (a). Assessments were colour-coded by the use of three-point conditional formatting where the lowest point was red and the highest point blue. Individual friendship groups are highlighted as thick black boxes. (b) Individual mark differences from the group mean for each of the friendship groups. Significance was determined by Kruskal–Wallis: all pairwise comparison followed by a post hoc Conover–Iman test. Significance was reported at $p > 0.05$. Image reproduced from [1].

How can communication with all students be achieved, if some sit in areas specifically to avoid this? The answer is through anonymity in interaction.

Interventions to Enhance Engagement



Module-feedback

> *"David's research has directly influenced the way that I interact with students, particularly the need for anonymous tools for engagement. "*
> Dr Katherine Hubbard (BTOY winner 2016)

Changing the Dynamics:

Issue: It is common practice in lectures to use pair-sharing to form ideas through discussion with others [6]. However, my study showed that friendship groups of similar ability are located together and gain similar marks [1]. Low achieving students are also sitting together and, through pair-sharing, are validating incorrect ideas [7,9].

Intervention: Facilitate broader sharing of work and breaking down the barriers between peer groups by changing the way pair-sharing is conducted. Students were instructed to swap work or talk with people in front or behind them, thus breaking out of friendship groups. Transient interactions then occurred between students in groups of differing abilities, resulting in a broader exchange of knowledge and a more inclusive experience [2].

> *"Discussion of the pause point questions is a massive benefit to our learning. It is particularly valuable as we all have different ideas to share."*
> Module-feedback

> *"David's work made me aware that I should be mindful of where students sit. I now assign different tasks according to the position, ensuring that students work across rows of the lecture theatre. After hearing his talk, I started to speak to each group before sharing the answers to reduce anxiety, especially in the low-achieving groups. I received some outstanding feedback for this module."*
> Dr Elizabeth Alvey (University of Sheffield)

Enabling Anonymous Interaction:

Issue: It is essential to student learning, wellbeing and equality that all have a channel through which they can interact with the lecturer. Yet, comments from students at the back and sides of the lecture theatre state that they do not wish to interact due to fear and anxiety [1].

Intervention: Enable interaction through web-based tools such as Socrative which allow anonymous responses from any device. Pause points were introduced into the lecture and answers to open questions sought. This intervention sets up a two-way dialogue, allowing the level of understanding and any misconceptions to be addressed [9]. For the student, it gives the opportunity to ask or answer questions they would not normally contemplate.

> *"David's integration of interactive activities has enabled me to learn effectively and ask questions I do not feel confident enough to ask in front of friends."*
> Student Quote

> *"David introduced me to Socrative which gave me confidence and flexibility in dealing with passive cohorts. I feel that this technology greatly enhanced the learning as the students solved problems."*
> Dr Tanya Klymenko. (Sheffield Hallam University)

Continuing the Discussion:

Issue: The students' interaction with the lecturer can be restricted to the taught session. Not all students are willing to talk one-to-one with the lecturer, a problem particularly identified with minority group students [10].

Intervention: Forums such as Padlet allow students to post anonymous questions in the form of notes to a virtual board outside the lecture. As they are hosted within the virtual learning environment, all students can see the questions asked. Both students and lecturers can comment and add media such as links and videos to help guide towards the answer. The boards were initially used within Biochemistry modules, but have now been embedded across the department.

> *"David's lectures are extremely engaging and interesting. They contain relevant content in a concise form. The use of the Padlet walls is very effective."*
> Student Quote

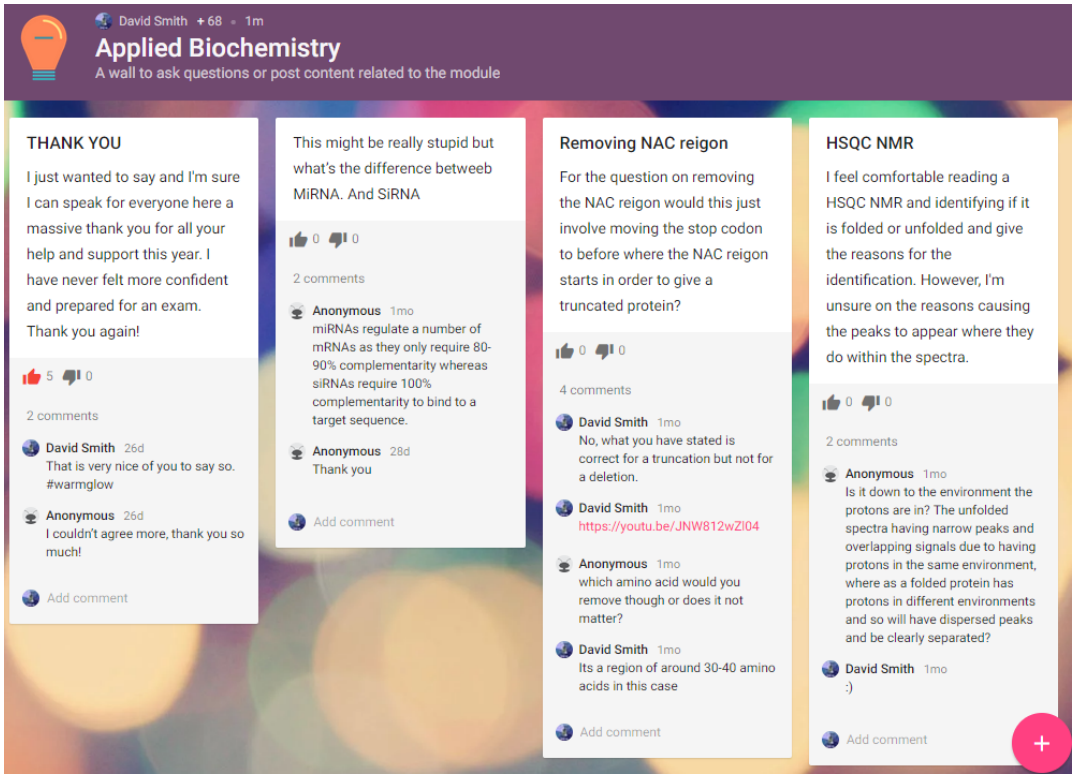


Fig3. Padlet support wall used in a final year Biochemistry module, showing examples of questions and responses from lecturers and students.

Reflections

I entered into the lecture theatre study with preconceptions about my students and how they engage. Uncovering that anxiety and nerves were forcing students to the edges of the room was a real driving factor in the introduction of the interventions. Critically, anonymous communication has led to a richer learning experience for all and has helped me discover where gaps in knowledge occur.

Implementing widespread use of technology within a lecture is not without its problems. Staff can be afraid to use it for the risk of failure. This issue was addressed here by training and one-on-one support. Open text response systems are open to misuse. To prevent this, ground rules were set with students as to the aims of the technology and discussions around what is and is not appropriate content were held. Moderation of posts was also used to prevent inappropriate material being shown.

Benefits

These interventions have been viewed extremely positively by students in module feedback with ratings of the learning resources provided in class and/or online at ~95% for either 'agree' or 'definitely agree' in 2018.

The mean exam mark in the core first- and second-year modules where these interventions were trialed has risen, from 45% to 52% ($p>0.01$) and 40% to 51% ($p>0.01$) respectively over the last three years without changes to the exam paper. The interventions have been embedded within a range of modules on the Biochemistry program over the same period, with NSS and PTES scores of ~100% being recorded for overall satisfaction.

	BSc Biochemistry (NSS)	MSc Biotechnology (PTES)
2018	100%	100%
2017	95%	100%
2016	100%	100%

"David's hard work and interventions are directly responsible for the excellent NSS scores."
Dr Nikki Jordan-Mahy (BSc Biochemistry Course Leader)

Dissemination and Publication

The research on student seating choice and the inclusive interventions has been shared widely at conferences and invited talks, and is a central theme for new staff development workshops. The approach has been taken up externally by colleagues at the Universities of Sheffield, Hull, Bradford and HYMS. Sharing of pedagogical theory has occurred via blogs and publications. Smith et al. (2018) recorded an Altmetric score of 208, having been covered in a range of global news outlets.

"David is an integral actor within the Bioscience scholarship community. His presentations are informative and impactful, and his work on how staff and students use lecture theatres has encouraged me to think about how I interact with my students and has corrected my own biases about student engagement."
Dr Dom Henri (BTOY winner 2018)

(Word count 1495)

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