Module design and teaching delivery

A partnership manifest between students and academic staff

Our world is changing and so are we.

This manifest is written with the scope to offer a glimpse into the development of academic modules, as shaped by the current teaching principles and latest pedagogical trends, while considering the students' perspective.

The objective is to enhance the learning experience, implementing in our curriculum elements of emerging needs and career orientations

Authors: Eleni Makrinou[1‡], Oliver Hood[1], Loris Marcel[1], Ronnie Alexander- Passe[1], Emma Pryke[1], Keerat Singh[1], Janice Kiugu[2]

1: Institute of Structural and Molecular Biology, Darwin Building, University College London, WC1E 6BT

2: Faculty of Life Sciences, University College London, WC1E 6BT

‡: Corresponding author

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Summary

University is a teaching institution pretty much like any other educational system, with one fundamental difference; the learning process is predominantly self-driven. Students are called to learn, time manage and be examined, in an otherwise high pace, demanding environment. In other words, to succeed they must become active participants of their learning process.

Teaching approaches are often referred to as pedagogic strategies. The word pedagogy is a derivative of the Greek **pedagogia (παιδαγωγία)** and is a generalised term encompassing the principles of teaching methodologies that can influence educational design models.

To ensure effective learning, teaching approaches are frequently reviewed and updated with recommendations that safeguard our students' learning experience. However, in the process of advancing our teaching delivery, we may tend to overlook the end recipients, our students. As with all concepts in life, there are always more than one points of view to realize any given situation.

During the Covid-19 pandemic, both academic staff and students became overwhelmed with challenging adjustments in the delivery of teaching material. In addition, the substantial increase in student intake numbers created the need to develop more modules and update our curriculum and associated activities in a way that would successfully facilitate our culture changes and address current and emerging learning needs and career expectations.

With the aim to advance our students' learning experience and academic performance, we run a survey based on a new Y3 module on life in extreme environmental habitats that we wish to launch for the academic year 2023_24. We have used this module as an exemplar, to create a recommendation manifest of learning, in partnership between the views of teaching staff and students.

The report has been supported by "Changemakers UCL" and contemplates the research outcomes from personal experiences and evaluation surveys of both students and

teaching staff from the department of Structural and Molecular Biology (SMB), within the Division of Biosciences.

SMB offers a BSc degree in Biochemistry, or Molecular Biology, with the integrated option to progress into a research intensive MSci program and graduate in four years, instead of three. In total, 141 Y2, Y3 and Y4 students participated, representing almost 66% of our students (**Table 1**). Y1 students, although an important percentage of the student cohort, were not included in the study, as they are novices to academic life and all their modules at this stage are compulsory.

	Y2 students	Y3 students	Y4 students	Total
Register	87	92	36	215
Took survey no.	55	66	20	141
Took Survey %	63.2%	71.7%	55.6%	65.6%

Table 1: Y2, Y3 and Y4 survey student participants.

An adjusted version of the survey was also taken by the SMB teaching staff. The department currently has 34 academic members and of those 18 participated in the survey, corresponding to around 1/2 of the staff (53%).

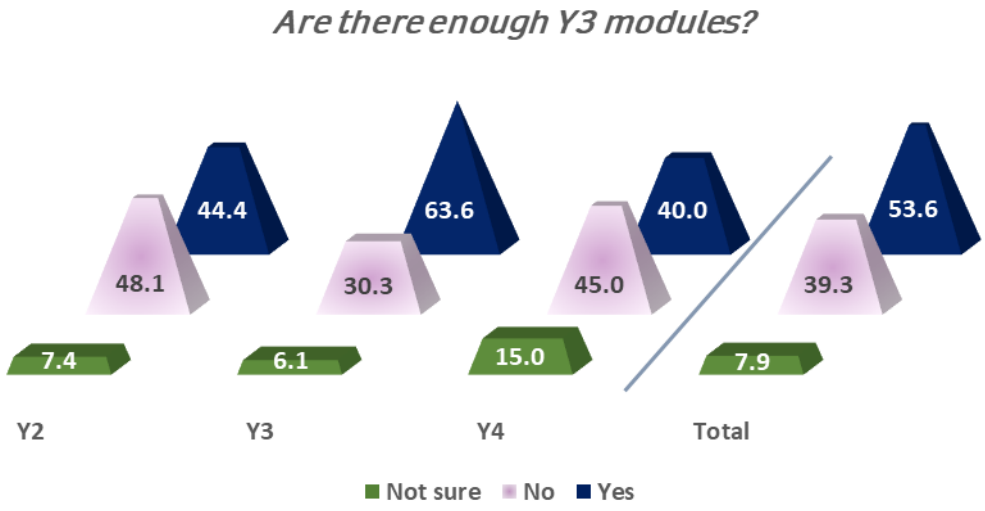
Information is organised as a good practice guide, in the form of a "*recommendations manifest*" and comprises of 4 main sections that cover current academic module selections, graduating routes, teaching methodologies and assessment criteria and preferences, a section of *"bite-size"* thoughts and opinions taken from the teaching staff interviews and a chapter of outcomes and recommendations. Finally, we conclude with our student participants' impressions for the Changemakers project. We have asked them to reflect upon the whole experience and recommend, if any, improvements.

Our target is to gain a better understanding of the teaching and learning drivers, inhibitors and distractors, for both the academics and students.

Chapter 1: Module availability and selection

Module selection is not an easy feat. Apart from year 1 (Y1) students where all their 7 modules are compulsory, years 2 (Y2) and 3 (Y3) have a few optional and elective modules to consider.

Asking the students whether they feel there is a good number of optional modules, most of them, especially Y3 students responded in a positive manner, stating that the already existing modules cover their needs and choice options, although Y2 and Y4 students would like to see more availability of choices (**Graph 1**).

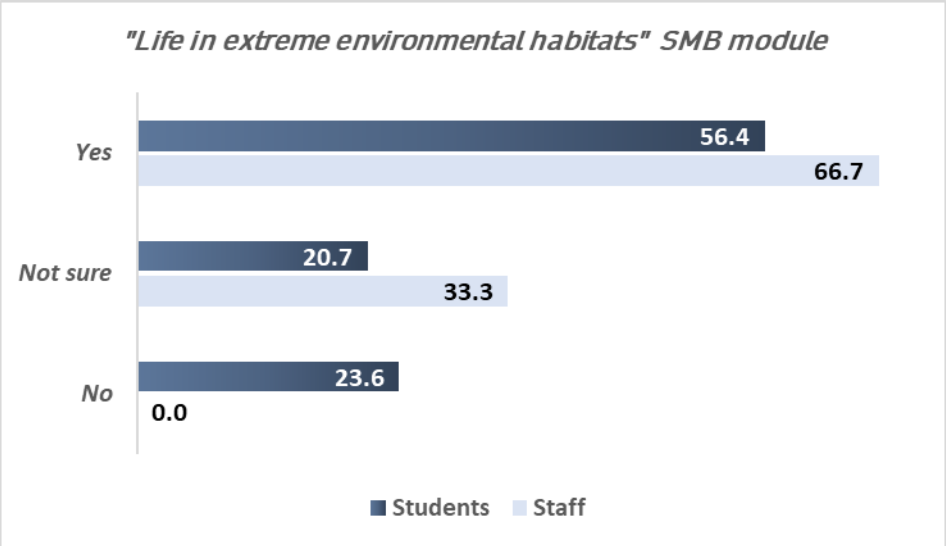


Graph 1: Availability of module choices

Although there is currently a reasonable number of optional modules that SMB students can choose from (at least 5 for Y2 and 9 for Y3 students respectively), due to the increased number of student intake during the Covid-19 pandemic in 2020 and 2021, there is need for more optional modules, especially for Y3 students, that can successfully accommodate the increased student numbers, while ensuring delivery of the standard high calibre teaching.

For the academic year 2023_24, we plan to launch a new Y3 module, on life in extreme environmental habitats. The module concerns microbial life in extreme environmental conditions, of both terrestrial and circumstellar habitable zones, as well as an in-depth view of origin and evolution of life and planetary bodies.

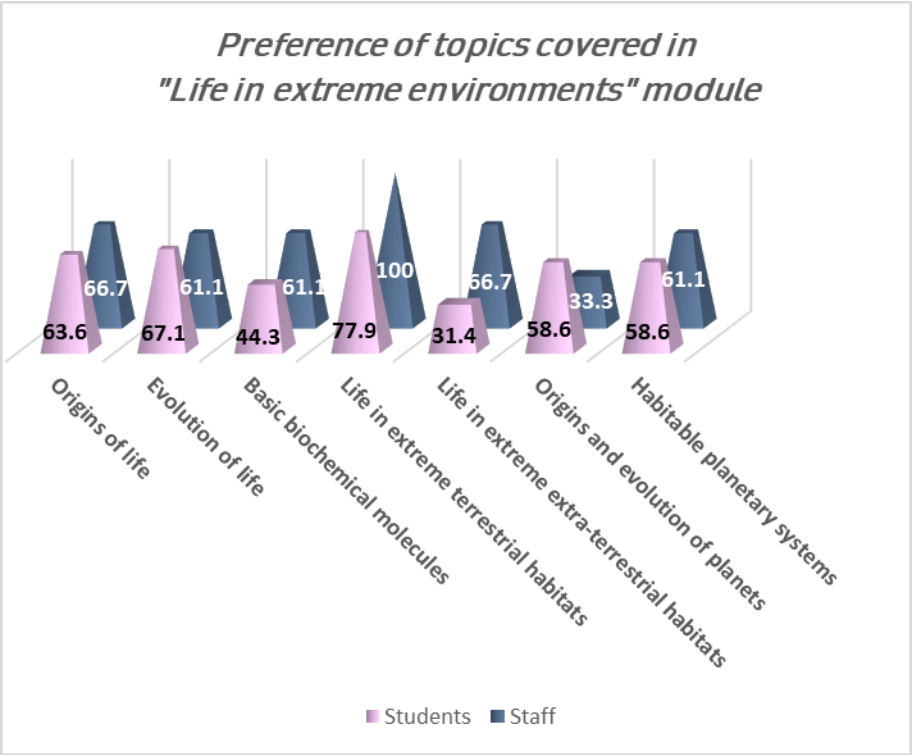
Reassuringly, 67% of our staff would like to see such an optional module run in our department and 33% feel that it may prove a good idea. Our students have also responded in a positive manner as 55% of all students would be happy to be able to choose such a module, but the rest feel either uncertain or negative to the prospect (**Graph 2**). Reluctance could stem from uncertainty, caused by lack of information from previous years' cohorts, especially when their performance will be assessed. Of those however, less than one third believe that such a module will prove useful and/or relevant to their future career (27%), whereas the rest cannot be sure as yet (35%), or don't believe that they will need it any time soon (38.6%). Students, understandably tend to be conservative to changes and novel concepts.



Graph 2: Development of a new academic Y3 module on microbial life in extreme environmental habitats

Many universities, both UK based (e.g. Open University, University of Edinburgh, Birkbeck, Newcastle, Leeds) and at a global scale (e.g. US, Australia), offer similar BSc and MSc modules, courses and degrees, in particular related to the study of interactions between microbial life and basic chemical components in extreme environmental conditions. Most of these courses were developed over the last decade and signify a trend towards furthering our understanding of untapped ecosystems and potentially utilising novel resources.

Although not conclusive, a variety of topics would need to be covered, to give a broad view of the subject. We asked both students and teaching staff what is their opinion for specific topics and documented their response (**graph 3**).



Graph 3: Preference of topics to be taught in the "Life in extreme environments" module.

All potential topics attracted interest, with lectures covering the origins and evolution of life, as well as life in extreme environmental habitats being on top of preferences for both students and staff.

Chapter 2: Graduating from university

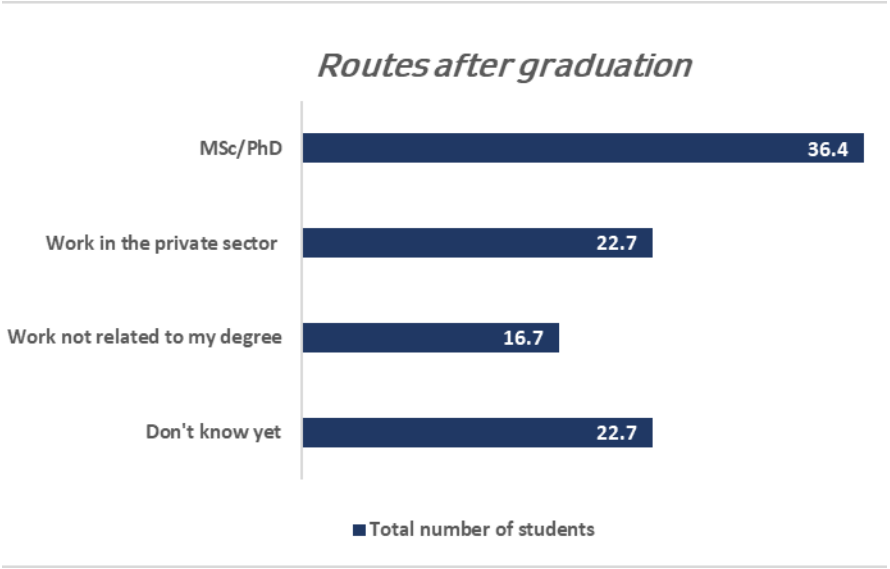
Job opportunities were always scarce, especially in a competitive environment such as the job market, but after the pandemic the situation became more complicated. Graduate students struggle to secure a job, particularly one that would inspire them, and which they would feel happy working at.

Even more, the job market has evolved in such a way that many undergraduate students, especially during their last year, neglect their course spending most of their time looking for jobs, updating their resume, writing personal statements and getting rejected with no meaningful feedback, if any at all.

We asked our students how they feel about job expectations, whether they know what they would like to do after they graduate and whether the university experience has prepared them for the career sector and/or changed their views/beliefs.

Many students across all years (36.4%), would like to continue with their studies, applying for a master's or a PhD degree. Apart from their inherent preference to continue to the higher education and potentially follow an academic career, another reason may well be a strongly competitive job environment that forces them either to delay finding a job in hope that things will improve, or/and to advance their qualifications, increasing their employment chances.

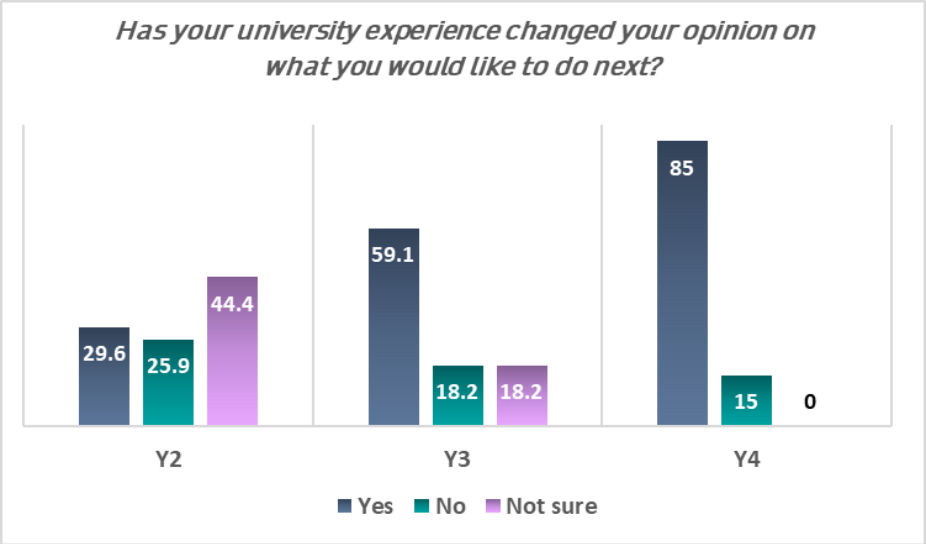
A lower percentage (22.7%) prefers to work in the private sector, predominantly in a pharmaceutical or biotechnology company starting to gain precious work experience as early as possible and hoping to advance quickly to a senior position. 16.7% will or wish to continue in a sector not immediately related to their degree, whereas ~23%, understandably are not sure yet (**graph 4**).



Graph 4: Preference of pathways after graduating

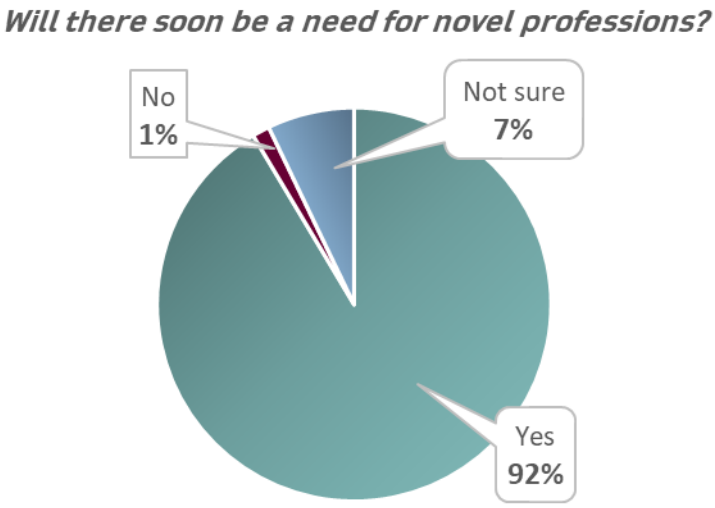
Interestingly, the study indicated that as our students progress into their degree, the university experience can play a significant role into shaping their perception and changing their opinion on what they would like to do after they graduate. To a certain degree this is expected, as throughout their academic years they grow, mature and their awareness

expands. However, it also indicates the influence and to a certain degree responsibility that academia holds onto maximising their potential future development (**graph 5**).



Graph 5: Influence of university life into students choice of future employment

When both students and staff were asked whether there will soon be a need for novel professions, the vast majority replied yes, with only a very small percentage either being uncertain or negative (**Graph 6**).



Graph 6: Opinion of students and teaching staff on the development of novel professions

Chapter 3: Teaching delivery

Teaching delivery practices have evolved significantly, especially over the past two decades. Whether a lecture, practical, or other type of teaching, we can utilise a variety of strategies that improve learning and cultivate collaboration in both small and large classes.

Effective learning is not passive anymore, but active. Active learning was first defined by Bonwell and Eison back in the early 90's as "anything that involves students in doing things and thinking about the things they are doing". In contrast to passive, active learning is student centered, creative and innovative, ensuring student engagement and conceptual awareness where knowledge is acquired through experience.

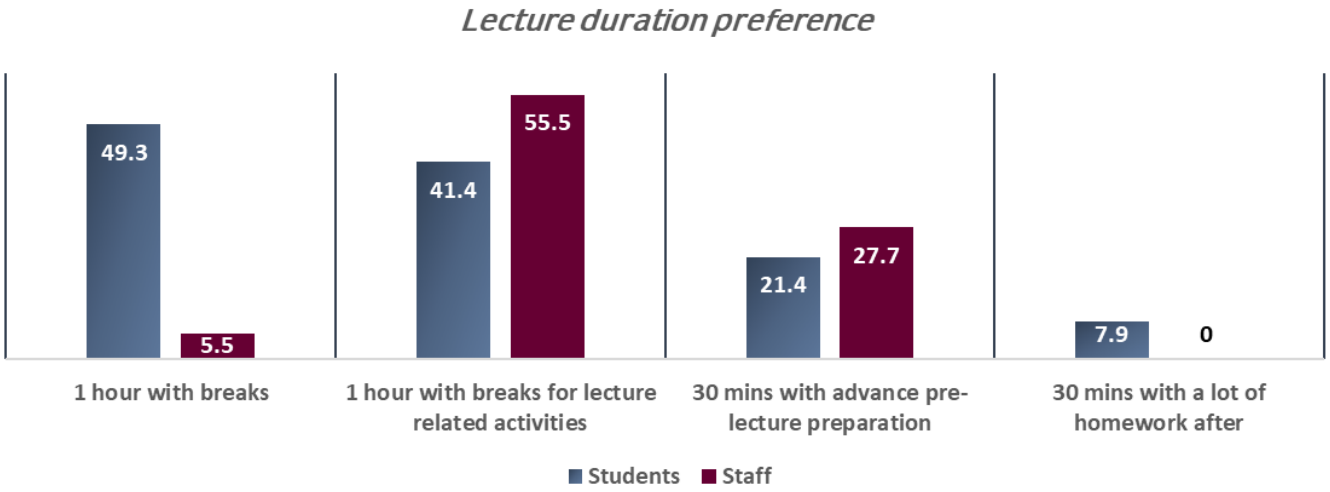
A positive learning experience relies on a number of prerequisites, such as student background knowledge, teaching duration and engagement of students with their instructor, their peers and teaching material through interactive activities.

I. Lecture duration

Cognitive, and educational research has indicated that the human brain cannot remain focused on one topic for long periods of time. The average time we can successfully concentrate on any specific topic is about 30mins. According to our survey (**graph 7**), the majority of both students and teaching staff believe that one-hour lectures with interactive breaks is probably the best, although it was pointed that the UCL hour is only 50 min and may prove challenging to deliver the lecture content, with integrated activities in such a short time. Therefore, it has been suggested that 1.5 to 2 hours lectures with frequent rest breaks and integrated activities should work much better, both for the students and the instructors. Breaks can be used as a reflection time where students, especially the ones that are timid can approach the lecturer and ask questions. Again, coordination and logistics can prove challenging.

A popular alternative would be 30min lectures, that help utilising time efficiently, with pre-lecture preparation at home, a model called "flipped classroom" that has gained increased popularity over the last 5 years. Online teaching with access to pre-recorded lectures, followed by live Q&A sessions also represent a form of "flipped classroom", where

time with the instructor is used constructively to enhance understanding and consolidate knowledge.



Graph 7: Students and teaching staff lecture duration preference

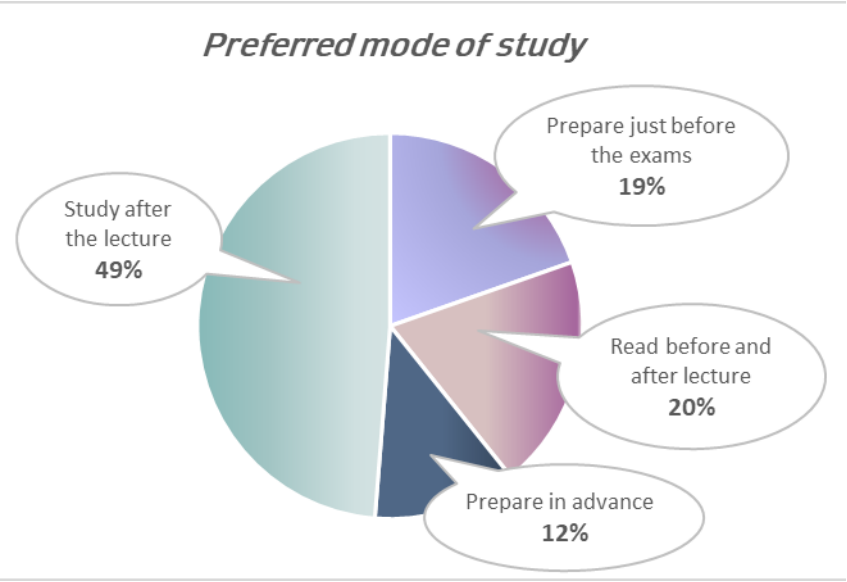
In this pedagogical model, students prepare in advance and use the class time for constructive learning, focusing on areas that need clarifications and higher order thinking. However, for this model to work properly, students need to prepare in advance, managing their time efficiently. In addition, teaching staff should plan all necessary teaching material, such as clear instructions, list of readings and activities such as video recordings well in advance and also allow for some time for the students to acclimatise to the idea that they will be attending a lecture knowing in advance what this lecture talks about.

Clearly no one liked the idea of 30min lectures with a lot of homework after. In general, students and teaching staff were in agreement regarding lecture delivery times.

II. Mode of study

Another topic we wanted to investigate was the mode of study students prefer to adopt. It is our policy to make teaching material available to students the Friday before the week commencing the lecture. This can sometimes prove challenging, as it needs good time management and adequate technical support.

Asking our students to comment on their learning routine, the vast majority of them (55%) across the different years stated that they usually read after the lecture delivery, whereas only a small proportion (13.6%) prepare exclusively in advance. Several students read both before the lecture and after, whereas there are always students that study just before the exams (**graph 8**).

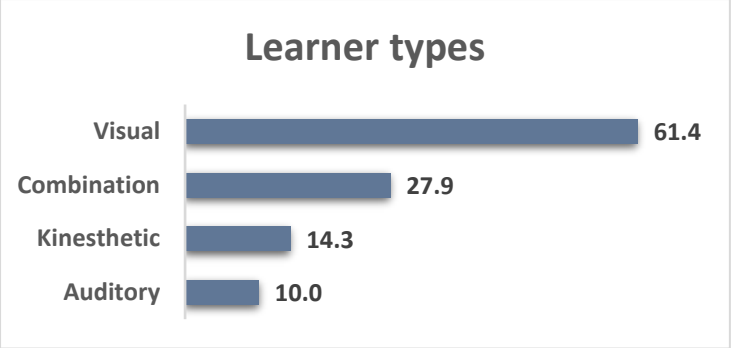


Graph 8: Preferred mode of study

III. Learner types

According to Dale's cone of experience (a 1960s' model that incorporates several theories related to instructional design and learning processes), people in general tend to remember only 5-10% of what they hear or read, whereas they can assimilate as much as an extraordinary 90% of their teaching if they actively participate, design, perform, or teach others.

An important parameter that should be considered when creating teaching material is how people relate best with new knowledge. There are many different learning styles. People can absorb information by visualising, listening, touching, or a combination of the above. Our data indicated that most students perceive themselves as visual learners (**graph 9**).



Graph 9: Student survey of learning types

Visual learners tend to remember best images, shapes, and colours. They can learn better by seeing someone else complete the task and then attempting it themselves. They may also enjoy reading or taking notes and can benefit from charts and diagrams. Therefore, integrating infographic material in teaching will help them engage better.

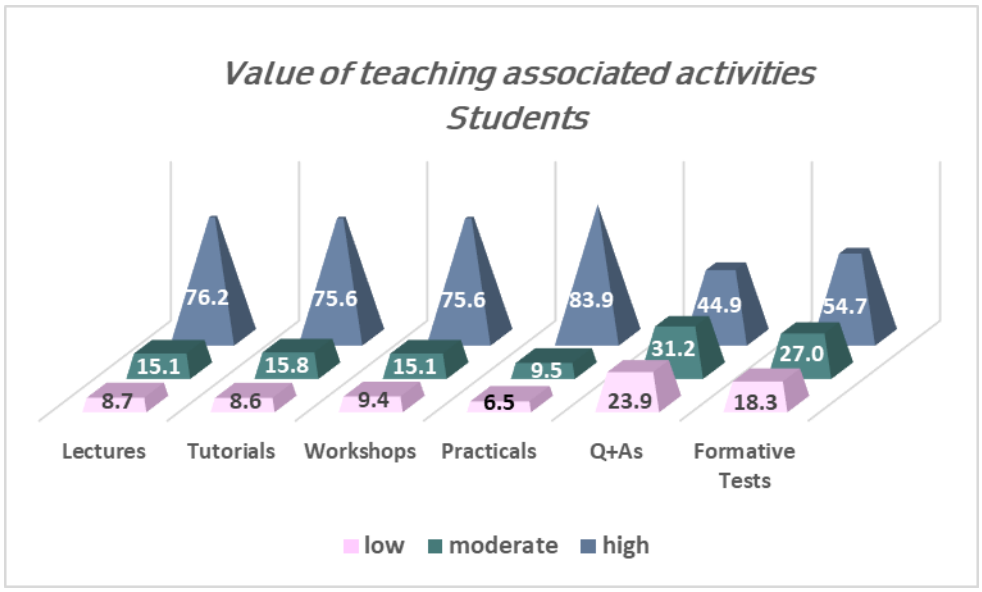
Auditory learners concentrate on and can recall voices, sounds and music. This type of learner needs to hear the information and enjoy lectures by listening the instructor, or peer students talking. Recorded demonstrations can help them associate with their study material. Finally, kinaesthetic learners remember by doing, and touching and will likely need to move around more frequently and learn about concepts using their hands and senses. Practical sessions and hands-on workshops would be ideal for this type of learners.

A fair amount of our students (~28%), consider themselves to be a combination of the 3 learning types, almost always being visual (**graph 9**). If we add this percentage to the 61.4% of only visual learners, we have a considerable and rather expected ~90% of our students relaying predominantly on infographic teaching material.

IV. Basic elements of teaching delivery

Undoubtedly, the most influential element of the learning process is the lecturer that delivers the teaching, designed with the students' needs in mind. Nevertheless, we wondered how both the students and teaching staff rank different teaching elements, in order of preference.

Data can be seen below **(graphs 10a and b**). Liking is indicated on a scale of 1 to 5, where 1 is the least and 5 the most preferred activity. For simplicity, the numbers were then pulled together in 3 groups, were 1/2 signify low, 3 moderate and 4/5 high preference.



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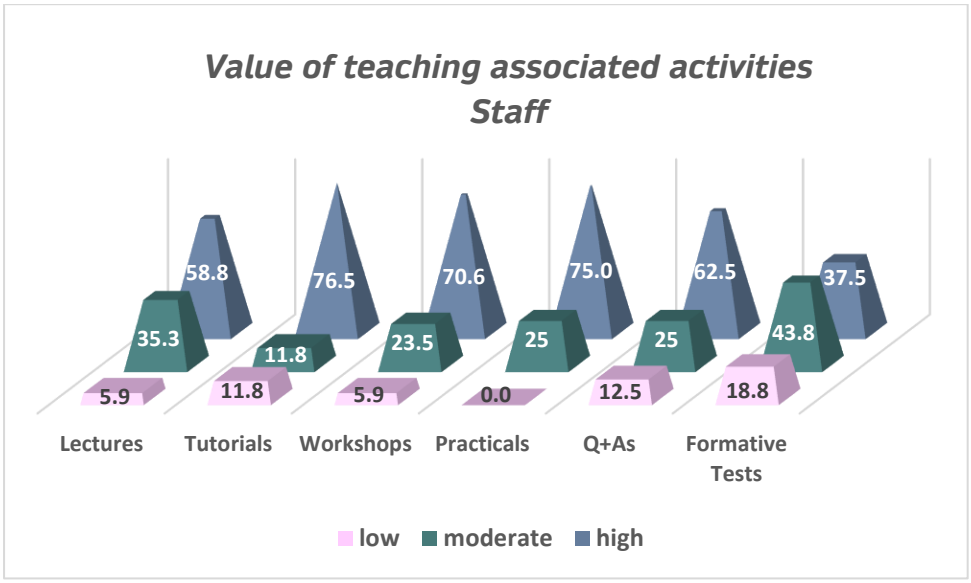


b.

Graphs 10a and b: Students and staff opinions on several traditional teaching associated activities.

Clearly both students and staff value practical sessions the most. They offer valuable hands-on experience, with students immersing into their learning, actively participating on a research project with targets and outcomes. Lectures, tutorials and workshops were also

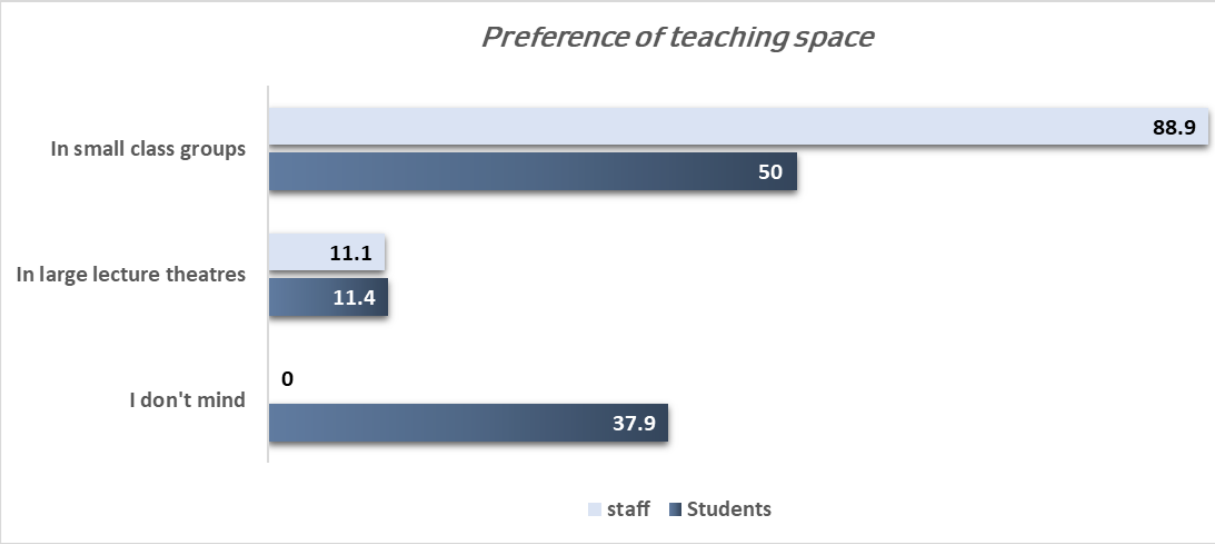
important for students, but Q+A sessions were not amongst the highly valued activities, in contrast with staff that felt Q+A sessions have learning value. As suggested by one of the lecturers that were interviewed, Q&A sessions work best in person and when they are planned. Otherwise, students either don't attend, or if they do, they are reluctant to engage, making their design and run by the instructor a challenge. Finally, students like formative tests, whereas staff tends to avoid them as a preferred method of knowledge consolidation (**graphs 10a and b**). Apart from the fact that they can be time consuming to prepare, as indicated by another interviewed lecturer, there is also a feeling that they can narrow the depth of independent learning expected from the students at the university level.

V. Teaching space

Traditional teaching involving lectures in large lecture theatres is very common across the academia. However, tradition, although important, may not be enough to cover current trends and future needs. Lately and throughout the academic sector instructors frequently face massive module enrolments, where they are called to simultaneously broaden their teaching, moderate for student educational diversity and systematically respond to student expectations. It can prove exhausting and can eventually compromise learning.

Space for teaching delivery plays a very important role. We asked both students and teaching staff what type of classroom they would prefer. The vast majority clearly prefers teaching in small groups, where all students can actively participate in a safe, friendly environment, and instructor can easily identify individual needs and offer support and personalised feedback accordingly (**graph 11**).

Small class sessions are currently run in our department, usually in the form of tutorials, whereas lectures take place in large lecture theatres. While the practicalities of space booking and timetabling can prove a logistic nightmare, a flexible teaching delivery with active-learning elements and flipped components can strengthen student performance in both small and large cohorts.



Graph 11: Student and teaching staff preference of teaching delivery space

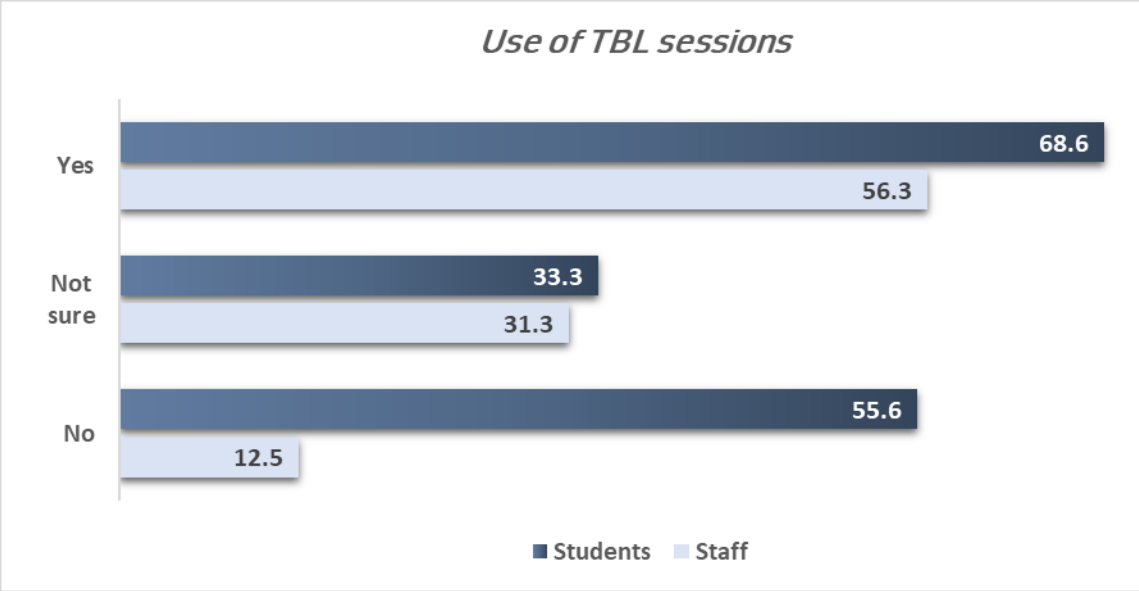
VI. TBL sessions and interactive teaching

A nice model that is considered the progenitor of flipped classroom easing students to the idea that they prepare in advance, is the Team Blended Learning (TBL) model, developed in the 1990's for business schools.

Briefly, TBL is an active learning approach that supports creative thinking, oral communication, and collaborative skills through a series of carefully orchestrated sequential activities that include pre-learning, and individual and group formative assessment, with immediate feedback by the instructor. The strategy is flexible enough to be implemented in classes of varying sizes including large lecture theatres, although it is easier to apply it in smaller size classes of <50 students.

We asked our students whether they would be happy to participate in TBL sessions, a learning activity requires preparation in advance. We also asked our teaching staff to evaluate TBL as a learning tool. The results were interesting and encouraging. 75% of the

teaching staff and ~69% of the students feel positive about organising and participating in a TBL session, respectively (**graph 12**). Despite the effort needed for both student and instructor to prepare in advance, it is a highly engaging process with alternating sessions that can make learning a pleasant, positive experience for everyone, as all team members will eventually need to contribute, balancing out group dynamics.



Graph 12: Students and teaching staff opinions regarding making use of TBL sessions.

VII. Collaborative learning strategies

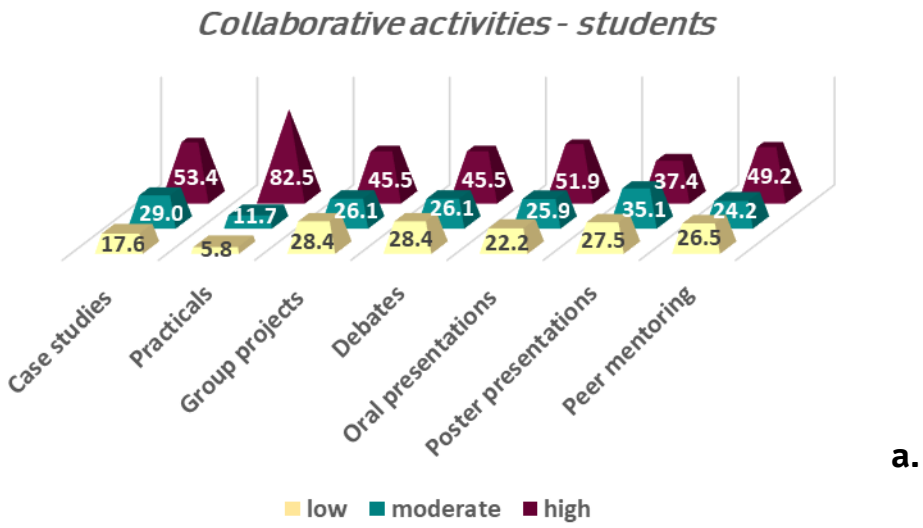
TBL is not the only active strategy to make learning pleasant and productive. Motivational activities for all types of learners (visual, auditory, kinaesthetic) with several of them requiring collaboration, can help improve the learning experience as they require students to learn using "higher order thinking" (Bloom's taxonomy), such as applying, analysing, evaluating, synthesizing, verbalizing and self-reflecting.

Furthermore, collaboration promotes inclusion, decreasing the achievement gap for minorities and first-generation university students, whereas it motivates participation of marginalised students and those with differing educational levels.

However, collaborative learning can also prove challenging. Students may feel resentment due to unequal peer contributions, or dominance of a particular group member

that prevents others from equal participation and decision making. Instructors should mitigate such disputes from the beginning, encouraging harmony.

To examine the effect of group work, we asked both our students and teaching staff to evaluate a number of those, stating their preference again on a scale of 1 to 5. **Graphs 13a and b** indicate levels as low (1/2), moderate (3) and high (4/5) preference.



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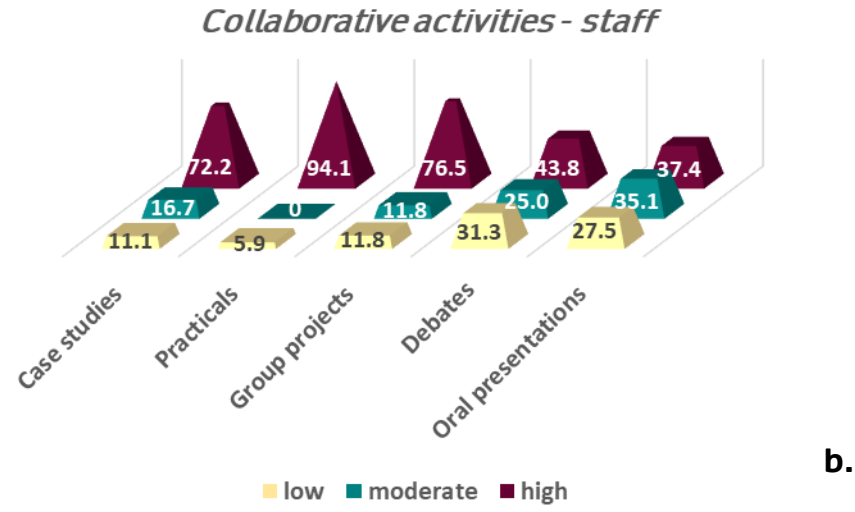


b.

Graphs 13a and b: Collaborative learning. Student and staff views.

Practical sessions are again the winner with 82.5% of students and 94.1% of staff clearly stating their value. Staff also values highly group projects and case studies learning,

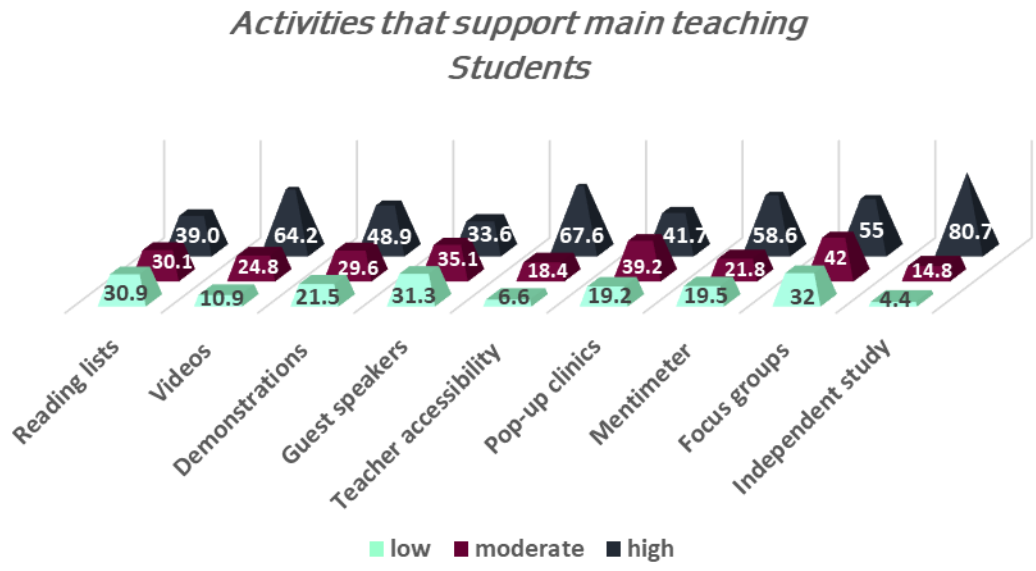
whereas students prefer case studies, but also oral presentations. Case-studies learning, is an established approach used across a wide range of disciplines where students work in groups under the guidance of their instructor, applying knowledge to real-world scenarios. (Lee, 2012).

VIII. Educational support components

Learning can be defined as the process of gaining knowledge by studying and is the result of both the students and their instructor efforts. The aim of teaching is to transmit information, that will be absorbed and used by the students. The teachers avoid passive learning by implementing in their teaching a range of activities, that aim to keep students focused and engaged. Equally, the students should make use of the interactive environment and further their education by independent study. It is important for the students to have access to educational support outside the classroom and for teachers to understand current and emerging needs and act accordingly. We asked our students and staff how much they value a number of elements that support the learning process, inside and outside the classroom (**graphs 14a and b**).

It is largely clear that the majority of students value immensely teacher accessibility and independent study. Results were the same even when we separated data for different years (Y2, Y3 and Y4). Visual help such as videos were also amongst their favourite, followed by focus groups and use of Mentimeter, whereas they don't really value a lot the reading lists associated with the module, guest speakers and pop-up clinics. Pop-up clinics and reading lists were the least favourite of the teaching staff as well. Pop-up clinics can prove a big asset for some modules, especially for Y3, where project students can have in-person regular feedback that helps them to answer their questions and progress. However, when students are given the option, frequently they fail to attend because they either have other engagements, or feel that it could prove waste of time, so perhaps their value and effort to set them up should be re-considered.

Finally, students and teaching staff agree that the most important element of successful learning is their availability for the students, whereas they also favour videos, use of Mentimeter or any other e-interactive support and demonstrations.



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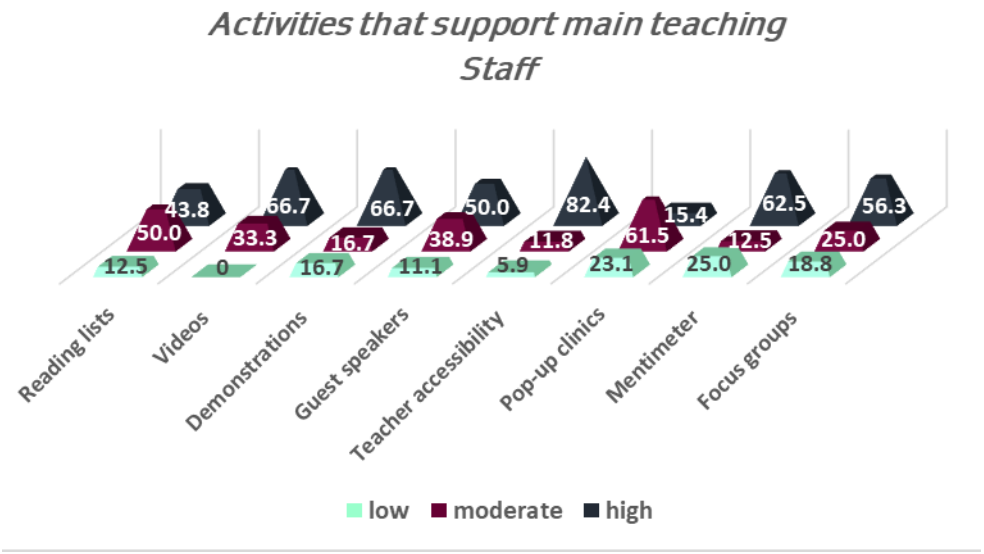


b.

Graphs 14a and b: Student and staff evaluation of learning support elements

Chapter 4: Assessment

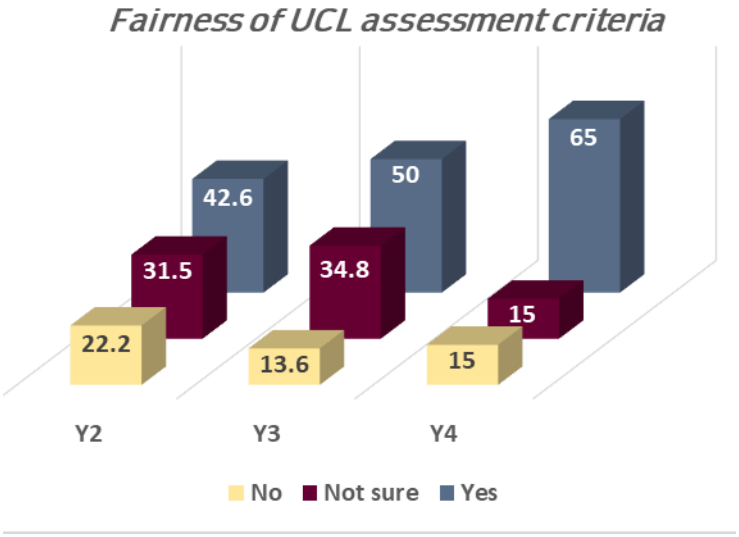
I. Assessment preferred types

Assessment is a very important element of the learning process and an absolute necessity that helps translating effort (study) into measurable evidence (grade).

Students are assessed in various ways and all educational institutions are committed to ensure fairness and equality of the evaluation process for their students. We asked our students whether they feel that UCL assessment processes are fair (**graph 15**) and in what

ways they prefer to be assessed, ensuring fair exam process and student evaluation (**graph 16**).

Across all academic years students feel that UCL exam criteria are fair, with their confidence increasing with the number of years they have spent at the university.

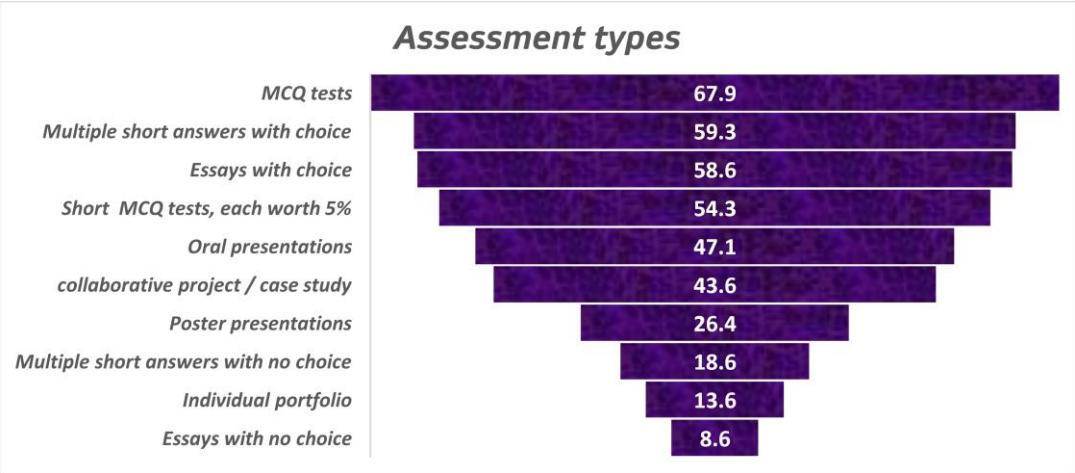


Graph 15: Students' opinion on fairness of UCL assessment criteria

Regarding the different types of assessment MCQ tests are on top of their preferences, followed by either multiple short answers, or essays with choice. MCQs can be time-consuming for the teaching staff to properly prepare. However, given the benefit of automated marking that saves time and standardises the process, they probably worth the effort. A choice of short answer questions, or essays is also a type of assessment that our students enjoy, as they offer flexibility. Nevertheless, instructors should be aware that this method of assessment can lead to compartmentalised learning, where students only learn well part of the curriculum, hoping to achieve high marks.

Students also seem to like the structure of several short MCQ tests spread throughout the term/year, where each adds a small percentage to their final mark. The practice of such tests has been used for some modules and the feedback of the module questionnaire has supported this notion, as it supports to some degree a sense of autonomy; if students do not perform well in one short MCQ test, they can be mindful and

still achieve a high final grade by putting more effort for the rest. However, students that revise only parts of the curriculum, find them time and effort consuming, as such short tests force them to revise all the curriculum, instead of concentrating on the parts that can potentially deliver the best and most grades.



Graph 16: Students preference on types of assessments.

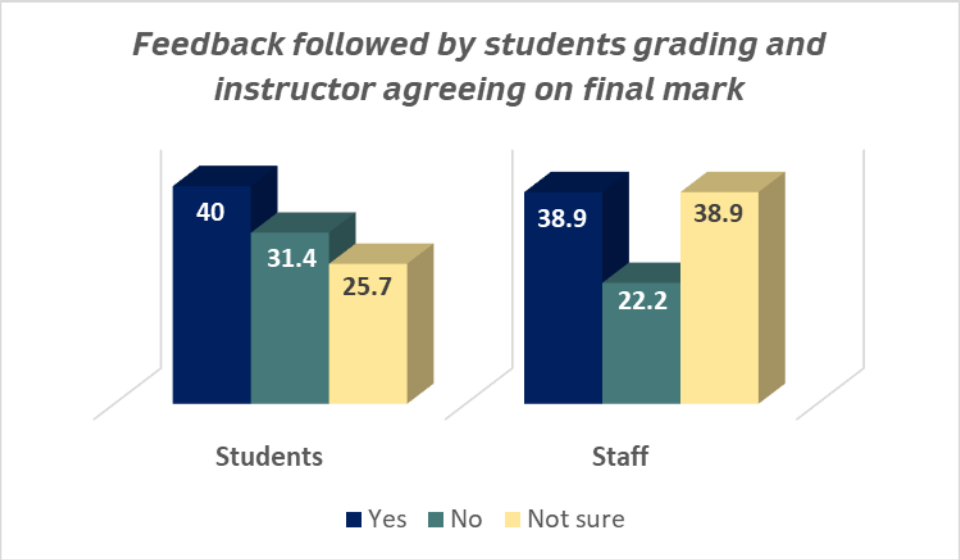
II. Feedback

Feedback is an important aspect of the learning process and perhaps the most valued element of an assessment; it explains the potential errors, it justifies the grades and it offers recommendations for improvement.

Elisabeth Gruner, an English Professor at the university of Richmond, published in 2022 a short article, on a feedback and grading process she adopted, called "*ungrading*", where she does not grade individual assignments. Instead, she offers extensive feedback her students' assignments and then gives them time to revise and give a grade to themselves, reflecting on the feedback they received. This type of grading proved successful, with minimal final intervention for marking corrections by the instructor. (https://theconversation.com/i-no-longer-grade-my-students-work-and-i-wish-i-had-stopped-sooner-179617).

We asked both students and staff whether they would be interested to adopt a similar marking approach for some of their assessment components, that would actively involve receiving feedback before a final grade is released. Most students and instructors liked the idea, but a fair percentage were also unsure of the outcome. Interestingly, more

students than staff feel negatively about it, possibly due to lack of confidence, or fear that it would generate more work for them (**graph 17**).



Graph 17: Students and staff preference on students receiving detailed feedback and then mark themselves with the instructor's correction where needed.

III. Exams support

We asked our students what type of support and guidance information they would like to receive before an exam to help them prepare for it. The vast majority would like to have been made to them available the marking criteria, exemplar exam papers and model answers (**Figure 1**). To a certain degree this is already common practice for most, if not all modules available within the SMB department. For example, marking criteria are made well in advance available to the students, whereas past exam papers are made available to them through the Moodle page, and/or library services. The argument for offering model answers is that at the level of university education, part of the students' learning curve is to drive their own learning, becoming independent and developing the formidable skill of critical thinking. Model answers will simply offer a template for them to follow, when academic thinking requires them to learn how to structure their own answers, reflecting their own understanding.

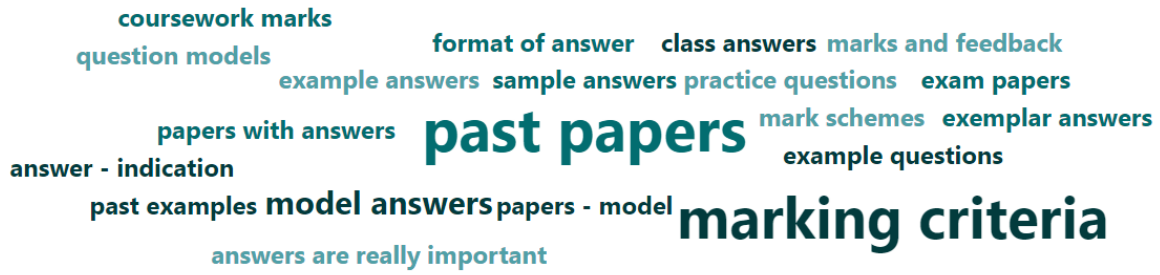


Figure 1: Students' preferences for support before the exams

IV. Exams format

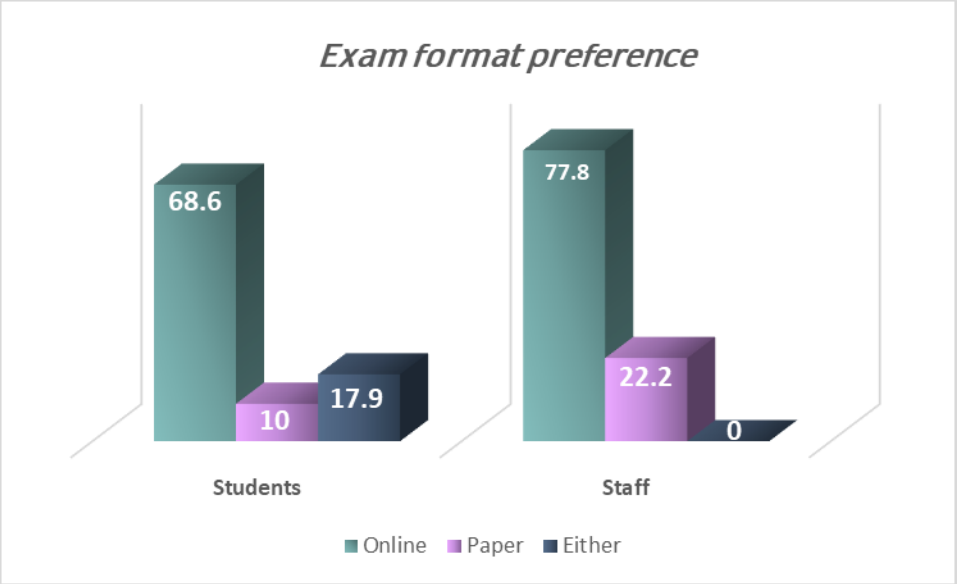
Finally, we asked both students and teaching staff whether they prefer online, or paper written exams.

The vast majority of staff and students prefer online with only a very small percentage wishing to go back to paper written exams. ~18% of students don't mind either way (**graph 18**).

However, when we asked staff what their greatest concern or challenge is regarding assessments, most worried about academic misconduct (Figure 2).

Figure 2: Staff concerns related to student assessments.

Overall, online assessment platforms have improved the assessment process, since they have minimised human error (everything is documented and they are more difficult to lose), but may pose an inhibitor for students that have some difficulty with fast typing, as they are called to perform within a short timeframe. Technical difficulties can also add a level of complexity and the chance for academic misconduct can prove for the assessor challenging. Nevertheless, the consensus is that the benefits outweigh the disadvantages, and therefore online types of exams are most probably here to stay.



Graph 18: Students and staff exam format preferences

Chapter 5: Teaching staff bite-size reflections

To allow as much personal input as possible, the students that participated to the Changemakers project, also talked to SMB members of staff. In total, 6 members of academic staff were interviewed either online (zoom, teams), or in-person, with an average interview time of 30mins (20-45mins). This chapter includes a collection of reflection highlights, as they have lately formed through the prism of the Covid-19 pandemic. Nevertheless, they most probably indicate long-lasting thoughts, concerns and hopes.

I. UCL as a university to graduate from

- With regards to how SMB/UCL differs from other universities, UCL could be regarded as softer, putting less pressure on students, and providing a more friendly and blended learning experience.
- Mirror where possible university experience to workplace expectations and conditions to provide a degree with enhanced employment prospects for graduates.
- Education should include skills-oriented and results-based modules and assessments.

II. Teaching practices

- Covid-19 has provided many challenges, but also highlighted new forms of teaching.
- Online only learning could lead to lowering of academic standards. A blended approach would be best going forwards.
- Use of a mix of teaching methods can help avoid repetition.
- Workshops work best in person, where students interact in-person with instructors.
- Q&A sessions are only beneficial if students keep on top of the lectures.
- Mentimeter helps with engagement, but we should be conscious that free text put up by students may be inappropriate.
- For small groups, in-person teaching is best
- For large cohorts online is better. Students can revise easily at their own pace.
- In-person teaching in large lecture theatres has issues with student engagement and timetabling coordination

III. Assessments

- Covid-19 has allowed different exam formats to be trialed, demonstrating that a blended approach of in person and online exams would work, if such exams are invigilated to prevent collusion.
- Online exams were largely successful and will be kept by the department going forwards.
- Pre-recorded lectures followed by live Q&A sessions led to better performance from students in exams
- Students' approach to revision is different to the past. They do not revise as hard and google exam questions – this leads to content that is not relevant and did not come from the lectures
- Assessment work best as a mix of coursework, tests and main exams.
- Timing does help with cheating - timed exams are preferred.
- Timed exams add pressure and stress to students that they don't all perceive and deal in the same manner. Creates a feeling that students are selected on something different than just their knowledge."

- An online short answer question could easily allow collusion.
- Invigilated exams in computer clusters are strongly preferred
- Very little difference is seen in the quality of exam responses when taken online as opposed to in-person.
- 'Live" answer submission formats similar to Moodle tests (answers are saved as you go) rely on having a reliable internet connection for the duration of the exam – this can prove unfeasible for many students.

IV. Feedback

- Results are proportional to the students' efforts. Detailed, extensive feedback to university level students can cause damage instead of improving.
- Instead of detailed feedback after, students benefit more by enhanced communication of assignment expectations before submission.
- Every assessment has different feedback needs, varying between lecturers and modules

V. New module

- Interesting to use structural bioinformatics to study the varying protein structures and properties in different habitats
- Benefit students as it will broaden the current module availability
- Concern regarding the lack of overlap with modules offered in previous years
- Concern that students might perceive it as an easier module to take. Assessments should be at par with other modules.
- Concern of lack of overlap between the module and SMB research interests
- Concern regarding student uptake – worry that the resources required to deliver the module would be wasted if student uptake is not high enough

Chapter 6: Survey outcomes and recommendations

I. Outcomes

1. Overall, students and staff share opinions, indicating a similar thinking pattern.
1. The job market is becoming constantly more demanding, with graduates struggling to make their way through.
2. Students frequently decide to advance their education, hoping to keep pace with the current job competition
3. Job competition leads to higher levels of unemployment and eventually stagnation. Emerging novel professions will support job recruitment covering societal needs.
4. University life plays a significant role into shaping the future of our students. This becomes prominent as they progress through their degree.
5. The vast majority of staff and students prefer online, invigilated exams, with only a very small percentage wishing to go back to paper written exams.
6. UCL exam criteria are fair. The notion is proportional to the students' year.
7. Teacher accessibility to the students is very important
8. Small group teaching is better than teaching in large lecture theatres
9. Teaching with breaks and interactive activities is favoured
10. ~90% of our students are visual learners, relaying predominantly on infographic teaching material
11. 55% of our students read after the lecture delivery
12. Hands-on teaching experience is of paramount importance
13. Active learning, is favoured to passive teaching.

II. Recommendations

1. Offer a variety of modules that can envisage the emergence of new professions
2. Strengthen hands-on practical and research experience opportunities for students
3. Deliver "Flipped classroom" lectures of 30mins
4. Deliver in-person lectures of 1 -2 hours, with breaks, interactive activities, individual student questions to the lecturer (during breaks) and student reflection time.
5. Implement teaching in small classes where possible, such as tutorials and focus groups.

6. Large cohorts teaching would benefit from elements of “Flipped classroom”, with pre-lecture material preparation and in-lecture Q&As, in-depth focused analysis, knowledge checks.
7. Deliver lectures with a strong element of infographic material for visual learners, as well as audio material support for auditory learners and hands-on elements for kinaesthetic learners.
8. Deliver lectures that involve student-student and student-instructor interaction, such as collaborative projects, cases-studies, use of Mentimeter, TBL sessions etc.
9. Design a mix of MCQ, short answer and essay writing assessments that have choice elements.
10. Ensure availability for students’ educational questions and concerns.
11. Tests and exams should take place online but invigilated.
12. Students value greatly their independent study. Offer a variety of support material, such as recordings, reading material and formative test exemplars to help them with knowledge consolidation.
13. Offer clear and where possible detailed feedback
14. Offer clear guidelines of module aims and objectives and expectations from students.
15. Offer exemplars of exam papers and model answers, where feasible.

Chapter 7: Student reflections

Emma Pryke:

“I have really enjoyed the experience – the ChangeMakers team have provided adequate support and deadlines so that there has been a good balance between structure, allowing the project to remain focused, and freedom, such that we were able to fully investigate our aims. This environment has allowed us to develop a scheme that will benefit the future teaching of UCL and perhaps beyond to other universities.

From a student’s perspective it has been interesting to learn what fellow students are keen to gain from university, as well as understanding the feasibility of this by interviewing lecturers. More generally, the project is very different from what I have experienced during my degree. This has allowed me to discuss new topics formally as well as interviewing others and devising questionnaires. I would recommend anyone considering participating in a

ChangeMakers project to definitely do it! It does not require a significant amount of your own time, but has the potential to provide a very high yield result!"

Ronnie Alexander-Passe

"With regards to my personal reflection of my participation in the Changemakers project, I found it gratifying being able to give back to, and support, the teaching and educational experience we receive as students at UCL. Whilst the exact nature and timescale of the project took time to get accustomed to, I suppose this is simply the nature of the project and the fact it overlapped with the exam period. However, one thing I would say is that the large multiplicity of students - there being 5 of us - sometimes led to me feeling superfluous, or that I didn't have a role, and I felt uncomfortable stepping up in front of older students who I automatically assumed would be able to perform a task more effectively than me due to their experience."

Oliver Hood

"This project gave an interesting insight into the existing procedures for developing modules at UCL and areas where this could be improved. Our in-depth interviews with members of staff combined with our surveys of staff and students were particularly informative and hopefully will help guide the styles of teaching and assessment used in future modules. I look forward to seeing the impact of this report and the proposed exemplar module on future students."

Loris Marcel

"I really enjoyed participating in the Changemakers project. I learnt a lot about how modules and teaching were designed and delivered at UCL, and enjoyed collaborating with both staff and students. I think next time the project should be started in term 1 to give more time for student participation, as towards the end of the years 3 and 4 are busy with finding jobs/applying for postgraduate studies.

Overall, this project made me realise that students can have their say in how they are taught, and that teaching methods are not set in stone. It is up to us to improve them constantly so that they are adapted to both lecturers and students. It's important for

students and staff to communicate regularly on this matter and I thank Eleni for starting this discussion!"

Keerat Singh

"Working on this Changemakers project has been a great experience. I've gained valuable skills in project planning, questionnaire development, interviewing and much more. I've really enjoyed working with everyone on our team and would highly recommend participating in the programme if you can!"

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