

MANCHESTER
1824

The University of Manchester

The University of Manchester
Institute of Teaching and Learning

**DR. THOMAS NUHSE
PILOT STUDIES
FOR A FLEXIBLE,
COMPETENCY-
BASED COURSE
IN QUANTITATIVE
BIOLOGY**

**ITL FELLOWSHIP 2021/22
PROJECT
REPORT**

www.staffnet.manchester.ac.uk/umitl/
teaching.learning@manchester.ac.uk



ITL Fellow 2021/22

THOMAS NUHSE

Thomas is a Senior Lecturer in the School of Biological Sciences, a Senior Fellow of the Higher Education Academy and Programme Director for BSc Biology. Having joined the University of Manchester in 2007 with a research focus on molecular signalling, his teaching now spans biochemistry, plant sciences and integrative biology, particularly of biotic interactions. Thomas has a long-standing interest in blended and online learning, flip teaching and online interactive tools, and more recently, case studies and problem-based learning.

Fellowship Student Partner Intern

PIOTR BLYSZCZYK

PILOT STUDIES FOR A FLEXIBLE, COMPETENCY-BASED COURSE IN QUANTITATIVE BIOLOGY

ITL Fellowship project

This project sought to address a gap in the teaching of quantitative methods at undergraduate level. The aim was to arrive at recommendations for the scheduling, delivery format, content, study mode and assessment options of an “ideal”, flexibly timetabled course in Quantitative Biology that builds students’ confidence in quantitative thinking and ultimately assesses competency in statistics and data analysis.

Context

At The UoM, programme ILOs of “knowledge of data analysis and statistical methods” are addressed via a zero-credit data handling unit in first year, but the curriculum doesn't subsequently build on that foundation in any systematic way, while nationally there is a recognized skills gap in mathematical, computational and statistical methods, despite data literacy being a key graduate attribute in an age of big data, spin and fake news.

It seemed to me that these quantitative skills are uniquely suited for flexible and/or online learning because they entirely depend on individual pace and active ‘learning by doing’ at the computer. Since the initial conception of this project, flexible learning has taken centre stage in the university strategy, that has the potential to increase student choice and personalization. Some of these possibilities are rarely explored, such as flexibility of course aims, content formats and assessment types. How much of this more radical flexibility would be welcomed by students remains largely an open question, although in one of my existing course units I have explored elements of student choice in this vein and the reception has overall been positive.

Objectives of the Fellowship project

The project aim was split into two key objectives:

- 1) To collect **qualitative data on students’ views** about the different dimensions of flexible learning and on what would keep them engaged if a new course in quantitative biology was set up, focus groups were organized.
 - 2) To design **pilot studies** applying various combinations of flexible course elements. Volunteers would work with the materials and feed back on their experience, motivation and preferences.
-

Activities

1. Data collection planning (Nov/Dec)

- Focus groups had been envisaged. To get more data from a larger number of students, a 20-question survey was added. In collaboration, Piotr and I planned the questions for the survey, the schedule for the focus groups, and the invitations and follow-up emails for participants. It was very useful to have input from Piotr, as a student who was new to the idea, and it helped keep questions clear and explanations straightforward. Piotr also made suggestions for the survey format. I built the survey (20 Likert-style questions) in Qualtrix.

2. Literature Review (Dec/Jan)

- Piotr undertook a literature search for accounts of flexible learning in academic journals and on teaching blogs, as well as accounts of teaching biomedical statistics and data analysis skills and a survey of current courses at the University of Manchester that teach quantitative skills. This proved very valuable and helped shape plans for the pilot courses.

3. Ethical Approval (Jan)

- I wrote the ethics application for all originally planned parts of the project: survey, focus group, volunteer sign-up for, and participation in, the pilot courses; data collection in the pilot courses and post-pilot focus groups. The need to write the questions and focus group schedules in full was an opportunity to map out the project in more concrete terms. Research storage was requested to store focus group recordings in accordance with data protection regulation. (Since this fell into the exam period, Piotr's input was necessarily more limited in January).

Activities

4. Survey (Jan/Feb)

- Ethics approval granted, the survey was emailed to ca. 2000 students on undergraduate courses in the School of Biological Sciences . Two “chasing up” emails were sent, and data from over 200 participants collected by March.

5. Focus Groups (Feb-Apr)

- (Feb/Mar) We planned the running of the focus groups. Emails of potential volunteers were collected in the large survey via a link to a separate survey to keep the main one anonymous. I organised snack packs and an encryptable recording device. Piotr managed everything else independently: invited participants, scheduled and ran the focus groups. Three separate sessions were run and recorded.
 - (Mar/Apr) Piotr transcribed and evaluated the focus group recordings, which went into the Putput Report (see below).
-

Challenges faced

I had underestimated how complex and time consuming the ethics application would be. This delayed the start of the actual work from December to February. However, the first part of the project (survey and focus groups) could still comfortably be completed.

... Challenges faced (cont.)

The proposal as a whole was very ambitious and did not really account for the time it would take to build the pilot courses, i.e. write and organize the teaching materials. I had not managed to tackle this in the summer before the start of the academic year. After work on the ethics application in January and the start of exam marking, the idea of building and running pilots in the same year had to be abandoned. Despite nominally being freed of some my regular work, some teaching contributions trickled back in and it proved almost impossible to carve out substantial time for this project in semester 2 other than supporting Piotr in his work.

Student partnership

From my perspective, the SPI's running of focus groups with students has been crucial and was the most successful part of the project. As lecturer, programme director and advisor to some of the potential student participants, too many conflicts of interest would have got in the way of a frank and creative exploration of flexibility.

In addition to Piotr, as the focus group leader, being essentially a peer to participants, it was beneficial that he was unfamiliar with the details of the participants' degree programmes. This ensured that students articulated their ideas and comments fully, if necessary with follow-up questions. Having worked with Piotr for a few months by the time focus groups started, I had full confidence that he had the organisational skills, drive, professionalism and understanding of the project aims to run these focus groups essentially independently, and to collect valuable data. I was proven right in that confidence.

Collaborative work

- A recent accreditation visit by the **Royal Society for Biology** has highlighted needs and opportunities for continued statistics training across multiple bioscience programmes. Before building pilot courses, I will consult other programme directors in the **School of Biological Sciences** on what scope and format of course would meet needs in their programmes, and perhaps what elements of existing courses can be adopted.
 - Colleagues in **Zoology** currently organize year-1 workshops on statistics and experimental design for field courses, while a parallel strand exists for students on lab courses. Zoologists also have dedicated final-year training in statistics. Close collaboration with colleagues running these first- and final year courses will be essential to ensure a new course provides continuity. It is likely that the Y1 workshop model (run by Dr T. Gilman, FSE) in particular is worth adopting for Year 2.
 - During the project I had not found the time to discuss with colleagues running comparable courses in **other faculties** that Piotr had identified. I will ask them to share their experiences of what worked and what hasn't in their domain.
 - I will continue to work with the **Institute of Teaching and Learning** and **Flexible Learning Programme (FLP)** team to disseminate the findings across the institution e.g. through an Open Workshop, membership of / presentation to an FLP sub-group etc.
-

Outputs

Findings

e.g. "When?" - Flexibility of pace, duration, sequence

Participants had a clear preference for pre-set **deadlines**, and there was a surprisingly strong opposition to flexible sequencing of module content.

More students disagreed than agreed with the proposition to set their own deadlines, and half of the respondents worried about falling behind if they were given that option (although almost as many disagreed; half of those 'strongly'). Along the same lines, there was limited enthusiasm for flexible **start times**, although 60% liked the option of **completing a course** sooner than scheduled. Completing a course over summer was a polarizing proposition, with similar numbers (strongly) opposed as (strongly) in favour.

This survey did not explicitly include questions about students' views on **asynchronous vs synchronous teaching**, although this is in part addressed in a later section of our full report (see below).

There seems to be **limited appetite for flexibility of timing**, whether for a course overall or individual deadlines. Other than the option of completing a course ahead of time, students did not wish for flexibility beyond current practice, which already allows for asynchronous, self-paced access to learning resources via the Virtual Learning Environment.

Output Report

- The full report of our findings can be found online: **Pilot studies for a flexible, competency- based course in Quantitative Biology** (July 2022)

Impact

The findings of this project, as far as completed in 21/22, will directly impact the design of the pilot studies originally envisaged to be part of the fellowship project. Hopefully the findings of part I - survey and focus groups - are sufficiently general to be useful for colleagues who are thinking about changing teaching or assessment in an existing course, or who are planning new courses. Ultimately the intended impact will be on the students who undertake the new course unit. Positive student feedback about innovative and/or unconventional ways of introducing flexibility in that course (as informed by the pilot studies) would mean success.

Reflection

The project was successful, even if on a scale that was much more modest than in the original proposal. I had substantially underestimated how difficult and time consuming it would be to build the pilot course itself (not helped by the fact that I have to do a good amount of learning myself), and overestimated how much time I would be able to carve out of my regular work to dedicate to the project. It was frustrating to have to let go of this part, given it was in the project title.

At the same time, I had underestimated how valuable and interesting the data from the survey and focus groups would be. This is a level of insight that would have been inaccessible to me by any means that are part of my regular job.

Next steps

In the short term, the dissemination of our findings via the university's Institute of Teaching and Learning and more locally, in a divisional away day, should be a useful contribution to the current institutional discussion on flexible learning ('the Flexible Learning Programme').

To move on to the actual pilot studies, much of the work is for me to do:

- to settle on the elements of flexibility that are most worth exploring (based on the survey/ focus group data);
- find/ write the content, then design and build the pilot courses on Blackboard;
- update the ethics survey;
- run the pilots and evaluate them. This may well be two or more years into the future.

Several colleagues have a stake in the teaching of data handling and statistics, so they will be involved at an early stage in the design of the pilots.

Thomas Nuhse
December 2022
