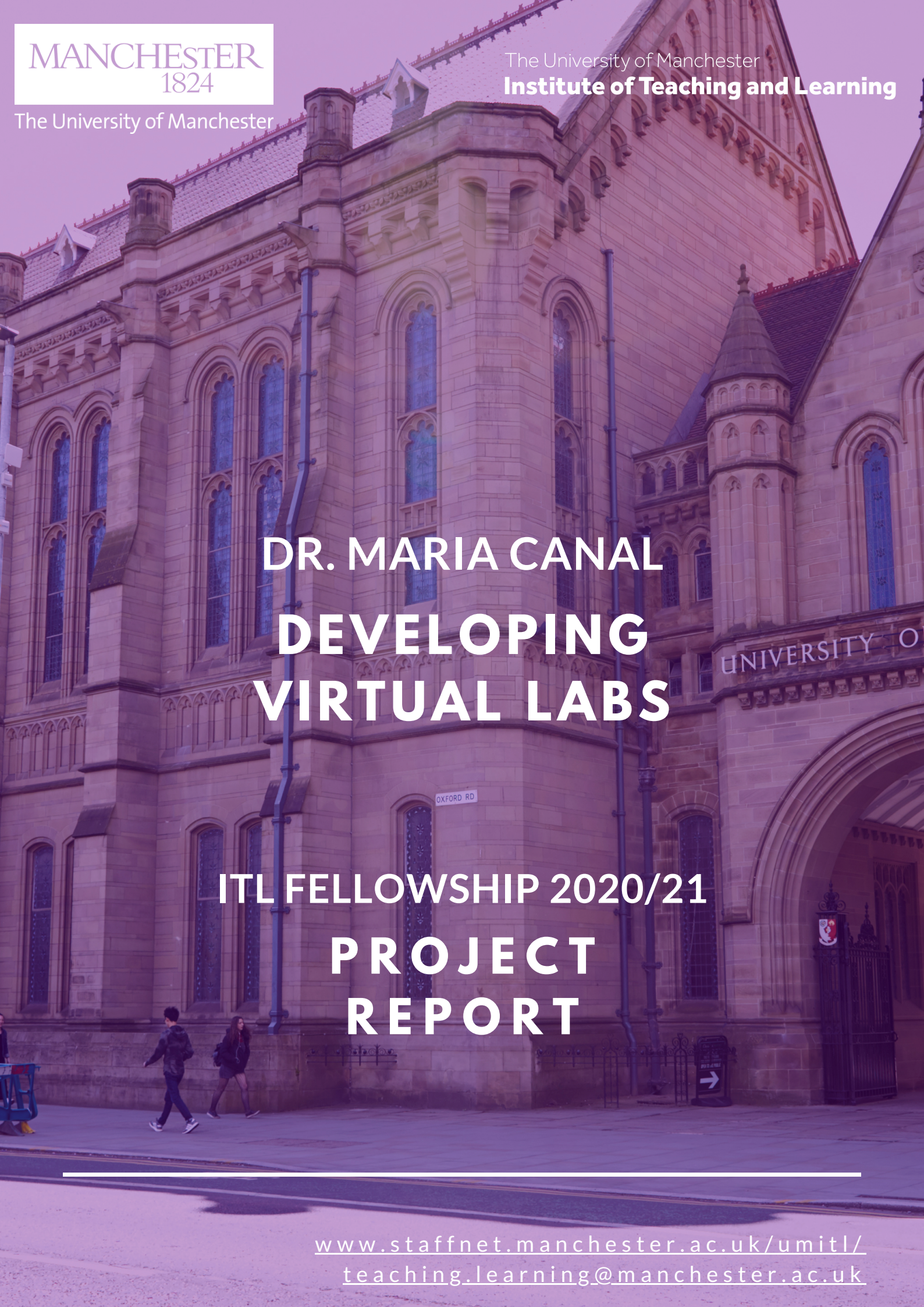

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DR. MARIA CANAL

DEVELOPING VIRTUAL LABS

ITL FELLOWSHIP 2020/21

PROJECT REPORT

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ITL Fellow 2020/21

MARIA CANAL

Maria is a Senior Lecturer in the School of Biological Sciences, and as the Neuroscience Programme Director has been involved in a range of teaching, learning and student experience activities. Maria contributes more widely to teaching and learning through her work as External Examiner at Liverpool John Moores University and Membership Secretary and Trustee of the British Society for Neuroendocrinology.
Maria is a Senior Fellow of the Higher Education Academy (SFHEA).

Fellowship Student Partner Interns

JESSICA CARROLL
FLAVIA ZHOU

DEVELOPING AN ONLINE VIRTUAL SCIENCE LAB PRACTICAL

ITL Fellowship project

My project was an exploration of the potential of virtual labs to create more flexible, interactive and personalised learning environments through the use of technology. This involved the development and evaluation of one such online 'virtual science lab' practical.

Context

Generally, virtual labs have been successfully incorporated into 'practical'-based courses in instances when they would not be possible in a normal lab setting; for example due to large student numbers, experiments running over several days, or concerns around safety. However, virtual labs are much more than a replacement for lengthy or risky experiments. Through judicious use of technology they can result in more flexible, accessible, interactive and personalised learning environments for all students. Furthermore, virtual labs are considered a form of “active learning”, which has repeatedly been shown to promote equity and inclusivity in higher education, engage students, improve learning outcomes and experience, and foster a sense of community amongst the participants.

Objectives of the Fellowship project

My initial proposal was to develop a virtual science lab practical, with two aims:

- First, to plan and deliver assessment and feedback that promotes ongoing learning and
- Second, to embed cutting-edge digital skills in our curricula

I would pilot this in my undergraduate neuroscience programme, but the idea was that the principles I learned about developing a virtual science lab through this pilot would be translatable more widely across the Faculties.

When the Covid-19 pandemic struck at the start of my Fellowship, the aims of my project remained the same, but its execution was fast-tracked.

Project activities

1.Research current science resources and software/technology available for virtual labs (March-April 2020)

This phase was initially planned to last 3 months but, given the need to fast-track the intervention due to the Covid-19 pandemic, it was completed by end April 2020.

2. Development of a prototype virtual neurophysiology practical for second year undergraduates (May-July 2020)

This was achieved with help from my Student Partners and our Faculty e-learning team.

3. Application for ethical approval to test the practical with a group of 17 students; collection and feedback analysis (August-November 2020)

A prototype of the practical was piloted over the summer, as a voluntary extra-curricular activity for students which did not affect their grades. We did well to get a sizable group of engaged students to feed back on the prototype and make recommendations for improvements.

4. Updating the new practical ready for delivery to students (November 2020-January 2021)

A key point that had been raised by our student volunteers was the lack of student-student and student-staff interactions in the pilot practical. We therefore incorporated group work, several Zoom sessions and formative feedback into the revised practical design.

5. Launching the new revised practical to the full cohort of students (February-May 2021)

The new virtual neurophysiology practical was launched to second year students in Semester 2 of the 2020/21 academic year.

6. Dissemination of the experience and resources of developing this practical to other science subjects across the University (July 2020 – April 2021)

Please see the "Outputs" section on page 7, below, for details on how I shared my findings from the project.

Challenges faced

Fast-tracking of the project in its initial stages, while the UK was in full lockdown, meant that everyone involved in the project (student partner, e-learning technologist and myself) had to work faster and harder than we had originally planned and, in addition, that we had to combine work and family responsibilities (i.e. childcare) under one roof.

After an initial fast start, there was something of a hiatus over the summer when we were going through ethical approval processes in order to be able to test the new online practical with the group of student volunteers. This proved to be a slow process with a steep learning curve.

Student partnership

Two student partners contributed to this project: Jessica Carroll (March-August 2020) and Flavia Zhou (August 2020 – April 2021). Jessica developed two educational animated videos and numerous diagrams which were incorporated into virtual practical teaching resources. She also tested and improved different components of the practical (i.e. pre-lab resources, lab exercises, post-lab assessments).

Flavia was key to running the trial of the practical pilot and dealing with students participants' queries, as well as helping to develop, analyse and report on student feedback surveys, both for the pilot and the final, revised virtual practical.

Collaborative work

In addition to the members of the core project team, I collaborated with unit coordinators (see Outputs 1 and 2 below), who provided input and feedback on how best to adapt the two new online practicals to fit the modules within which they were included.

I also collaborated with a wide range of staff across different programmes within the Faculty of Biology, Medicine and Health (FBMH) to produce a document with guidelines and recommendations on how lab-based practicals could be adapted into blended or online delivery (see Output 5).

Outputs

1.An **online Neurophysiology practical** for the compulsory Level 5 (second year) unit, Neuroscience Research Skills Module (108 students)

2. An **online Neurophysiology practical** for the compulsory Level 6 (third year) MSci Experimental Skills Module (88 students)

3. An **online resource repository for staff**, compiling over 200 online educational resources in different subject areas

4. An **online practical workshop** (July 2020) to help staff converting face to face practicals to an online equivalent.

5. I chaired the Faculty of Biology, Medicine and Health (FBMH) **Practical Oversight Group**, involving discussions with 18 different staff across the three schools in our faculty, and produced a series of recommendations aimed at all academics involved in the design and delivery of practical courses in FBMH. (July 2020)

6. I delivered a talk, "**Developing Online Practicals**" at the annual School of Biological Sciences celebration event.

7. I wrote a **blog post** for the Institute of Teaching and Learning (University of Manchester)

8. I presented at **AdvanceHE's annual Teaching and Learning Conference** (July 2021). (See On-demand session abstracts for details).

Impact

- **Student satisfaction:** 97% students found that all the information they needed was provided; 72% students felt that technology had been used effectively to facilitate learning; 90% of students enjoyed the interactive aspects of the practical; 87% students interacted with an instructor during the practical and 88% of those found this interaction helpful.
- **Student attainment:** there was a 23% increase in students' academic performance on the full-scale practical compared to the prototype.
- The various talks and resources that I created (Outputs 3-6) **helped colleagues re-design** their practical courses.
- My **blog post** (Output 7) had 93 views in one month and I was invited to give a talk at **AdvanceHE's annual Teaching and Learning Conference** (July 2021). (See On-demand session abstracts for details).

Reflection

The project was very successful. It not only achieved its original objectives of developing an online Neuroscience practical and dissemination at different levels (School, Faculty, University), but it exceeded expectations as an additional online practical was created (Output 2), and the results of this project were disseminated beyond our University (Advance HE Conference, Output 8).

Next steps

To build on the repository of useful educational resources (including examples of good teaching practices) across different subject areas and course types.

Dr. Maria Canal
July 2021