Student-led development of online support material (films and Moodle quizzes) to facilitate transition into Year 1 Chemistry

BSc Project
School of Chemistry

University of Glasgow

Jarrett Gray
Dr Linnea Soler
Dr Ciorsdaidh Watts

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What was the problem?

- What Year 1 students told us:

"There was a lot of different equipment I didn't know. The uni lab is very big and that is intimidating. This was stressful and I was anxious."

"I was scared because I read about dangers of compounds."

- What literature told us:

Transition to university science labs leads to cognitive overload[1]

Lab manuals alone do not bridge the gap adequately for Year 1 students[2]

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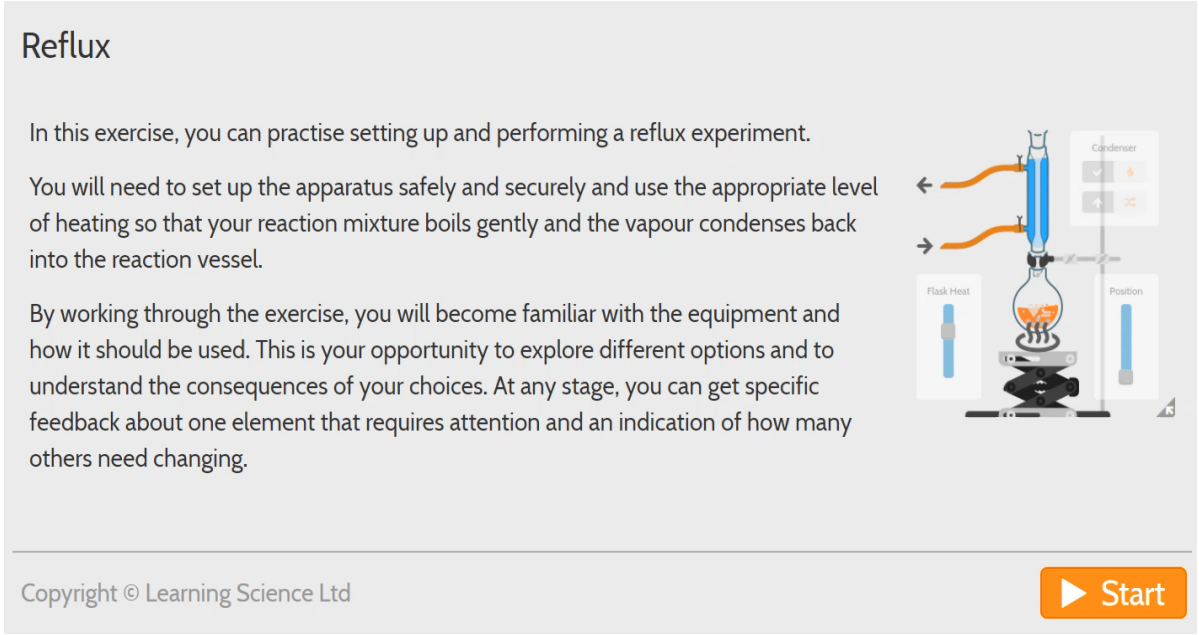
What was already in place?

- Lab manual (**written**)
- Learning Science pre- anc post-lab resources (**active**
- In-lab help from technicia



Preparing the solutions

Accurately weigh out 2.44 g of blue copper(II) sulfate ($CuSO_4.5H_2O$), record its appearance, and dissolve it in 15 mL de-ionised water in a 100 mL beaker (see **Appendices 1-2** and online pre-lab **simulations** for accurate weighing). The copper(II) sulfate and the balance can be found in the fume hood for this experiment.

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What did we want to do?

- Support **transition** into **Year 1 Chemistry** (c. 600 students)
- Facilitate **varied learning** styles to improve **accessibility**
- Reduce cognitive **overload**
- Address **anxiety** on entering the lab
- Explore core practical **techniques**
  Equipment, common errors, solutions, safety
- Improve **retention** of knowledge and skills going forward

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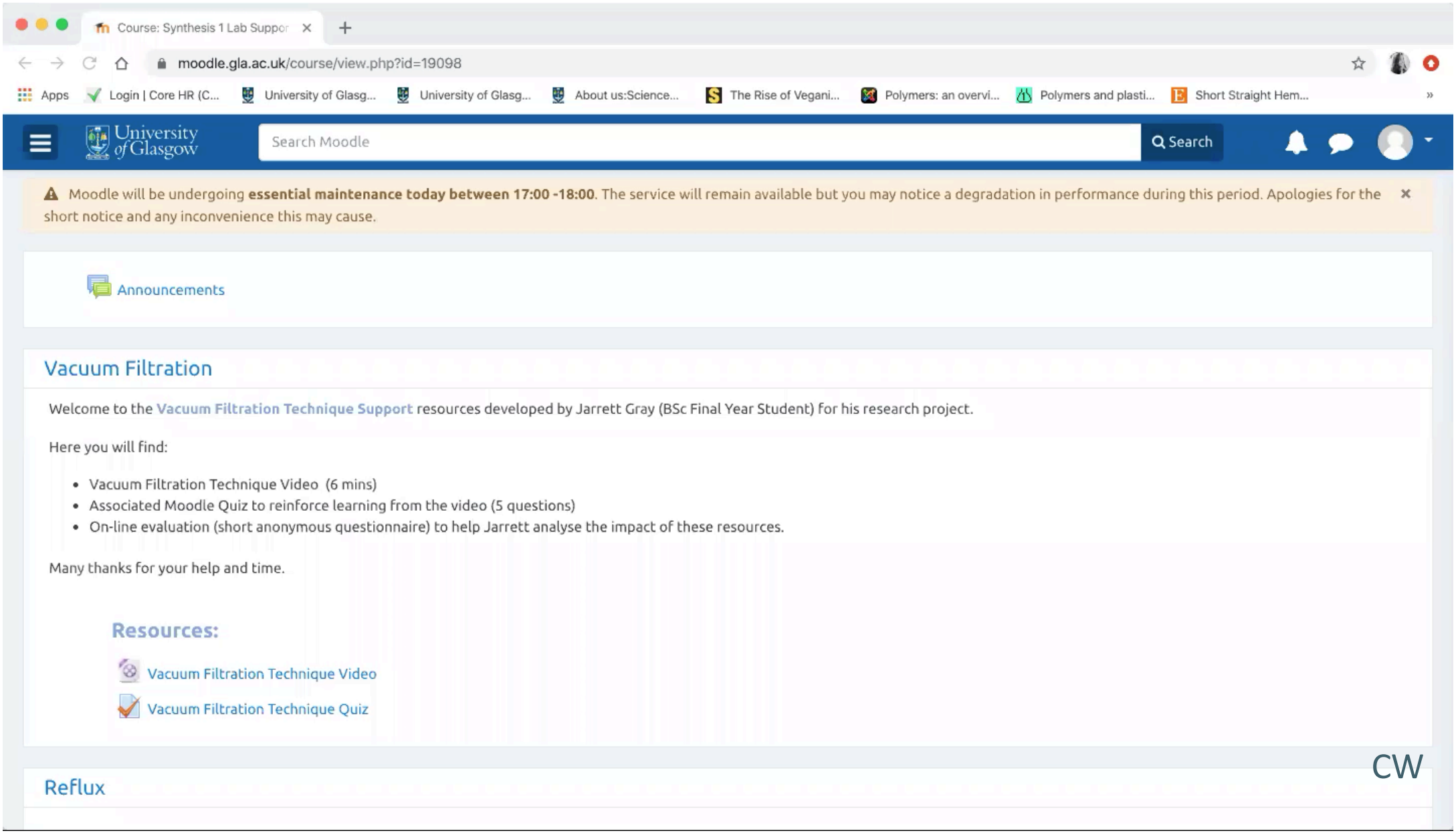
What we did…

- Filmed, edited two technical pre-lab **videos** (5 min each):
  1. Vacuum Filtration
  2. Reflux
     - Safety and important notice pop-outs
     - Subtitles and equipment signage
- Devised accompanying pre-lab Moodle **quizzes** (5 MCQs each):
  - Detailed feedback on all answers
  - Detractors designed based on common errors and misconceptions
- Delivered new resources on **Moodle**


Next, clamp the findenser, ensure the top of the findenser is not stoppered and that there is a snug fit between the findenser and the round-bottom flask.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Moodle will be undergoing essential maintenance today between 17:00 -18:00. The service will remain available but you may notice a degradation in performance during this period. Apologies for the short notice and any inconvenience this may cause.
Announcements
Vacuum Filtration
Welcome to the Vacuum Filtration Technique Support resources developed by Jarrett Gray (BSc Final Year Student) for his research project.
Here you will find:
Vacuum Filtration Technique Video (6 mins)
Associated Moodle Quiz to reinforce learning from the video (5 questions)
On-line evaluation (short anonymous questionnaire) to help Jarrett analyse the impact of these resources.
Many thanks for your help and time.
Resources:
Vacuum Filtration Technique Video
Vacuum Filtration Technique Quiz
Reflux
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How did we assess impact?

- All chemistry students (all years) given **access** to new resources
- Technicians and demonstrators given access
- Anonymous online **questionnaire** invites sent *via* Moodle
- Three **focus groups**; Year 1 (two students), Year 4 (six students), technicians/demonstrators (four technicians, one demonstrator)
- Gained **ethical approval** to assess impact of resources

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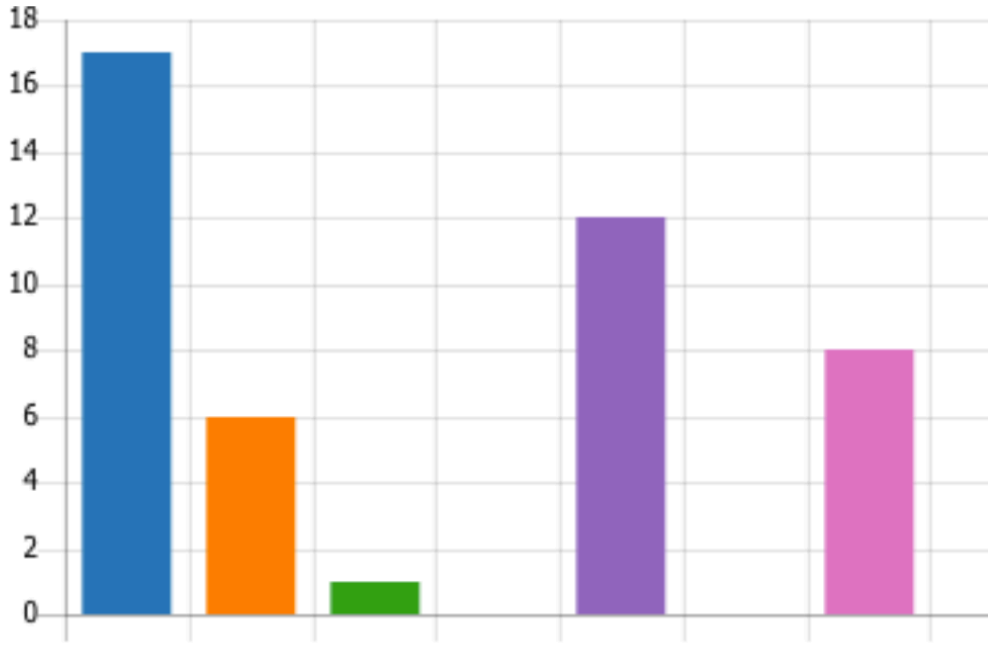
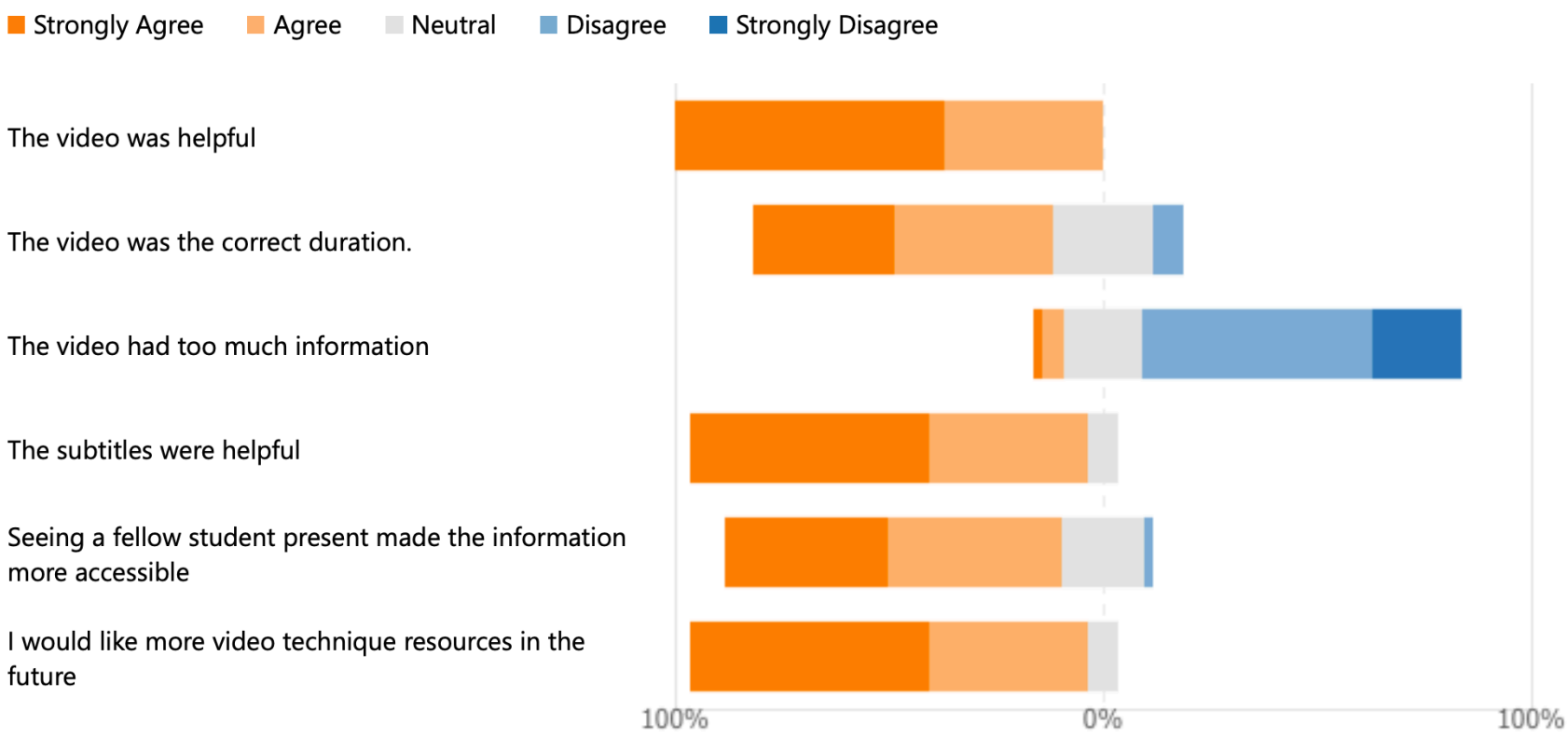
Online questionnaire results (students)

Chem-1	17
Chem-2	6
Chem-3	1
Chem-3 (Chemical Studies)	0
Chem-4 (BSc)	12
Chem-4 (MSci)	0
Chem-5 (MSci)	8
PGT	0



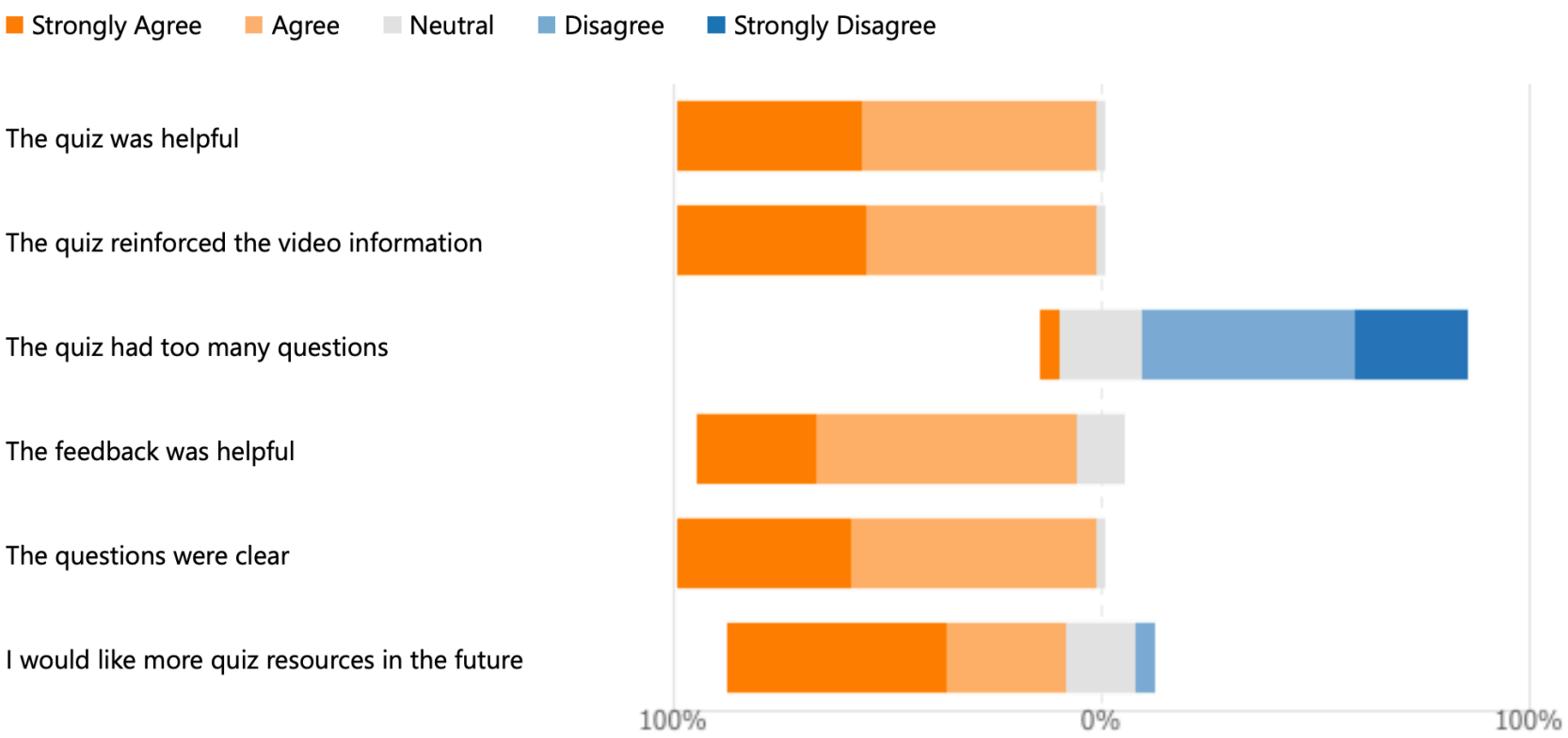
Online questionnaire results (students)

8. Please evaluate the Reflux VIDEO.



Online questionnaire results (students)

9. Please evaluate the Reflux MOODLE QUIZ.



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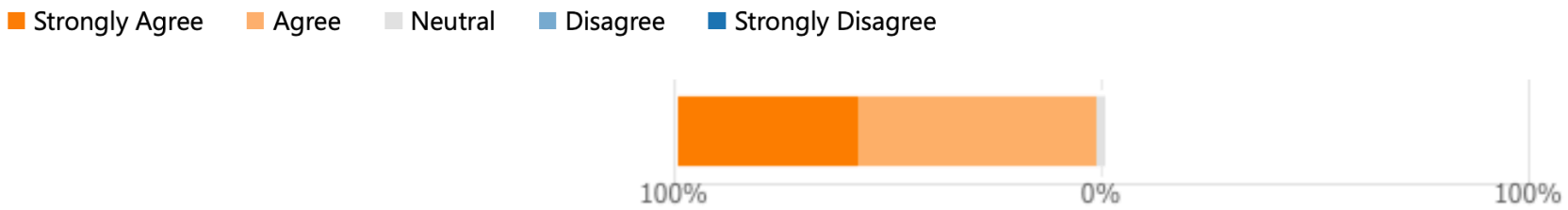
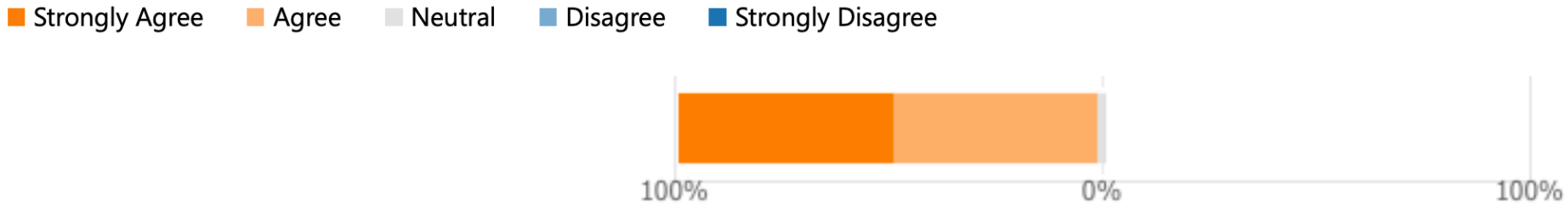
Online questionnaire results (students)

13. Access to the technique Videos and Moodle Quizzes BEFORE the Synthesis-1 lab would have improved my student learning experience in the lab.



14. I would like the technique Videos and associated Moodle Quizzes to be extended to cover more laboratory techniques.



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Online questionnaire results (4 technicians)

Questions relating to **Reflux video**

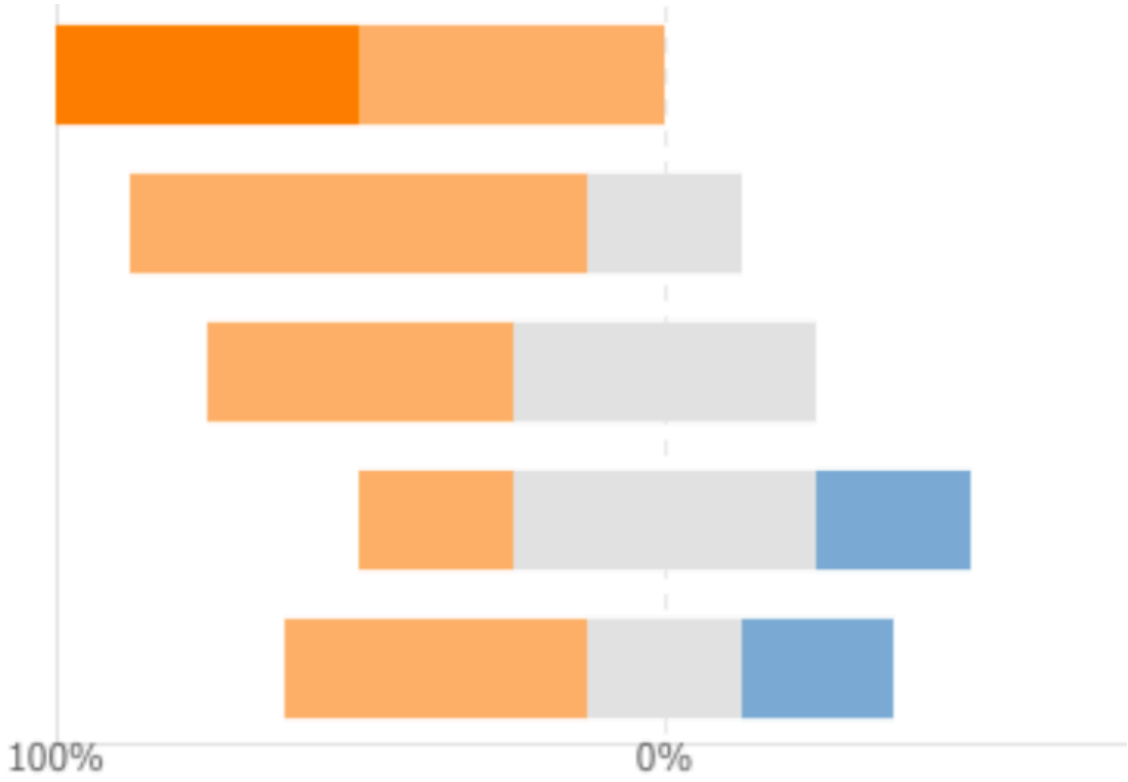
The students will be able to identify and use correct equipment more easily after viewing this

This video will make my job as a technician easier

As a technician , I would access and use this video to refresh my skills

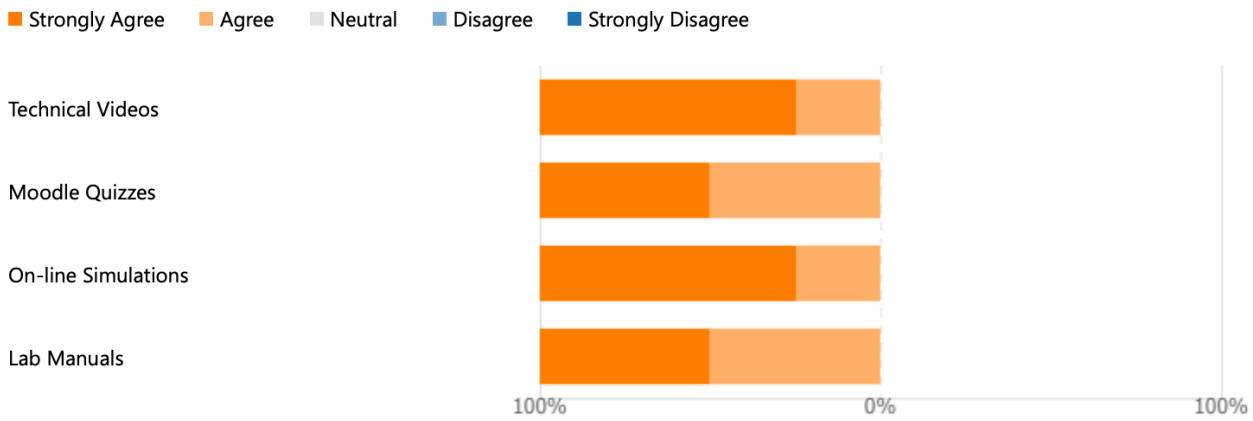
As a technician , my use of this video would enhance my confidence in the teaching lab

As a technician, my use of this quiz would enhance my confidence in the teaching lab



Online questionnaire results (4 technicians)

11. These resources (would) help to improve safety in the lab.



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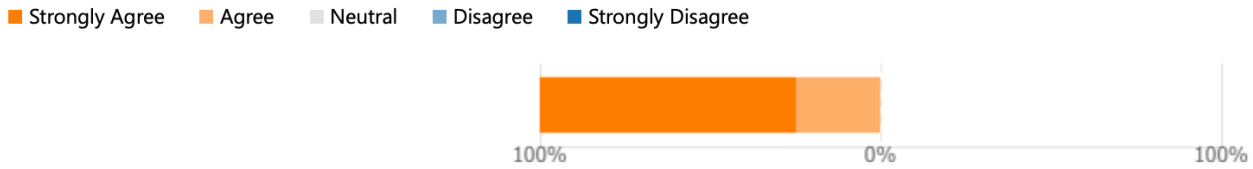

Online questionnaire results (combined)

"I cannot emphasize enough how helpful this would have been as a resource prior to entering synth 1 labs last year, instead of being given a booklet and told to go and do it." *Student*

"I think videos would have helped me because the pictures on the internet are not always the same as we use in the lab." *Student*

"I think the interactive quiz and videos are a great resource for the students and I feel it will help student confidence within the laboratories." *Technician*

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Focus group results (combined)

"Labels on the video work very well…helps to make the association, which is hard to do from just the lab manual." *Student*

"Learning from failure is not a bad thing. Video shows how to do it (and the idea of failure in the videos was quite a helpful thing)." *Student*

"Have only positive things to say about the videos! Takes away shyness and so makes our job a lot easier. More would be useful, including on safety." *Technician*

"It [the video and quiz] is very good to refresh chemistry, gives a lot more confidence before demonstrating." *Demonstrator*

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What next?

- Address suggested **improvements**
- Develop **suite of technical videos** (and Moodle quizzes) for Year 1 labs
- Make **accessible across chemistry** years and labs
- Embed into **demonstrator training** course?
- Expand video **support for transition** to Year 1 chemistry to include;
  welcome, theory, safety etc
- Actively **disseminate** findings internally and externally

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References and thanks

1. Tabel K.S. Revisiting the chemistry triplet: drawing upon the nature of chemical knowledge and the psychology of learning to inform chemistry education, *Chem. Educ. Res. Pract.*, **2013**, *14*, 156

2. Rollnick *et al.* Improving pre-laboratory preparation of first year university chemistry students, *International Journal of Science Education*, **2001**, *23*, 10, 1052-1071

All the **students** for the invaluable input.
School of Chemistry **technical staff** and **demonstrators** for their support.

@Ciorsdaidh @DrLinneaSoler