

Building resilience and scaffolding peer support through facilitating low-stakes group work

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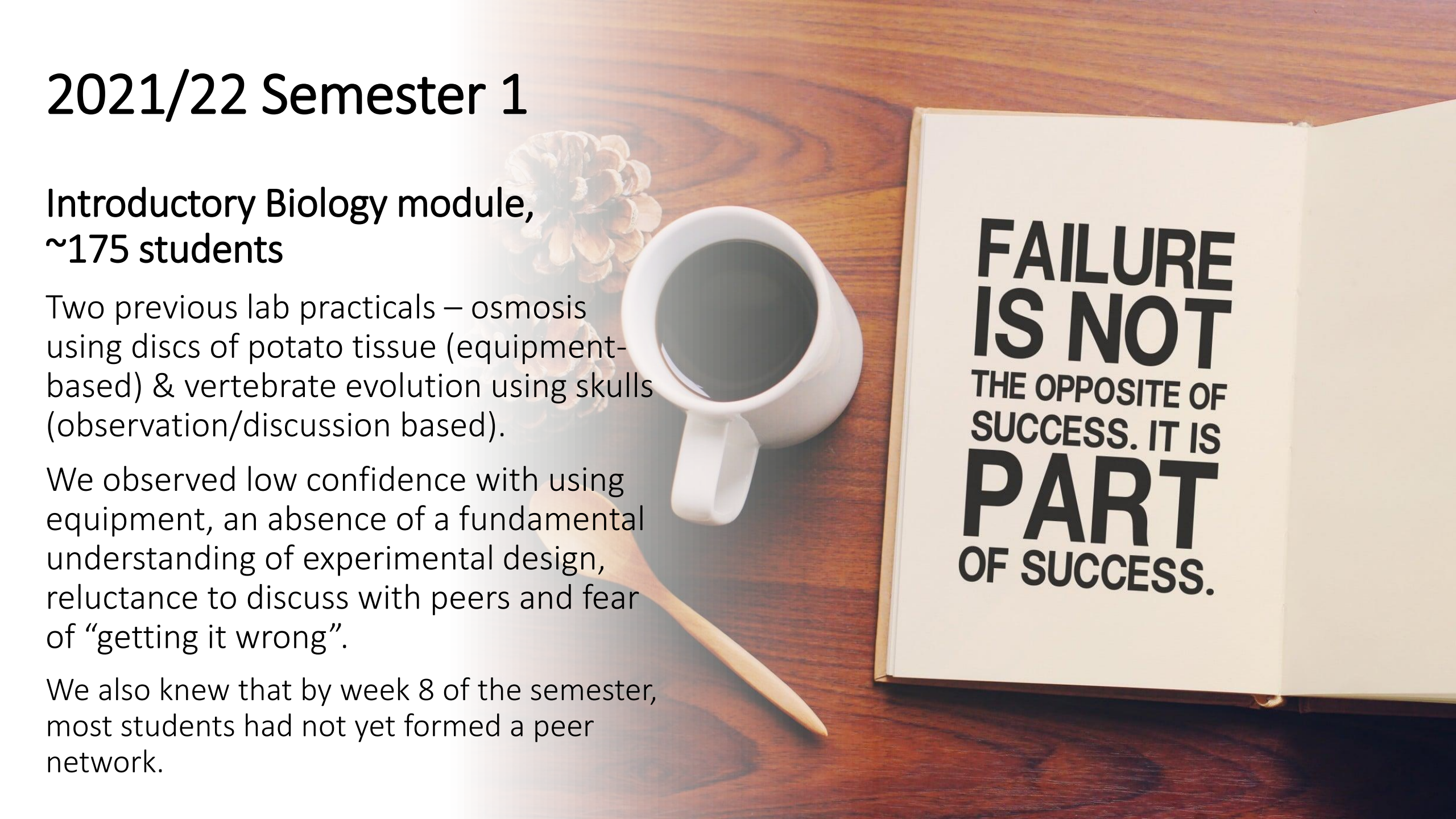
2021/22 Semester 1

Introductory Biology module,
~175 students

Two previous lab practicals – osmosis using discs of potato tissue (equipment-based) & vertebrate evolution using skulls (observation/discussion based).

We observed low confidence with using equipment, an absence of a fundamental understanding of experimental design, reluctance to discuss with peers and fear of “getting it wrong”.

We also knew that by week 8 of the semester, most students had not yet formed a peer network.



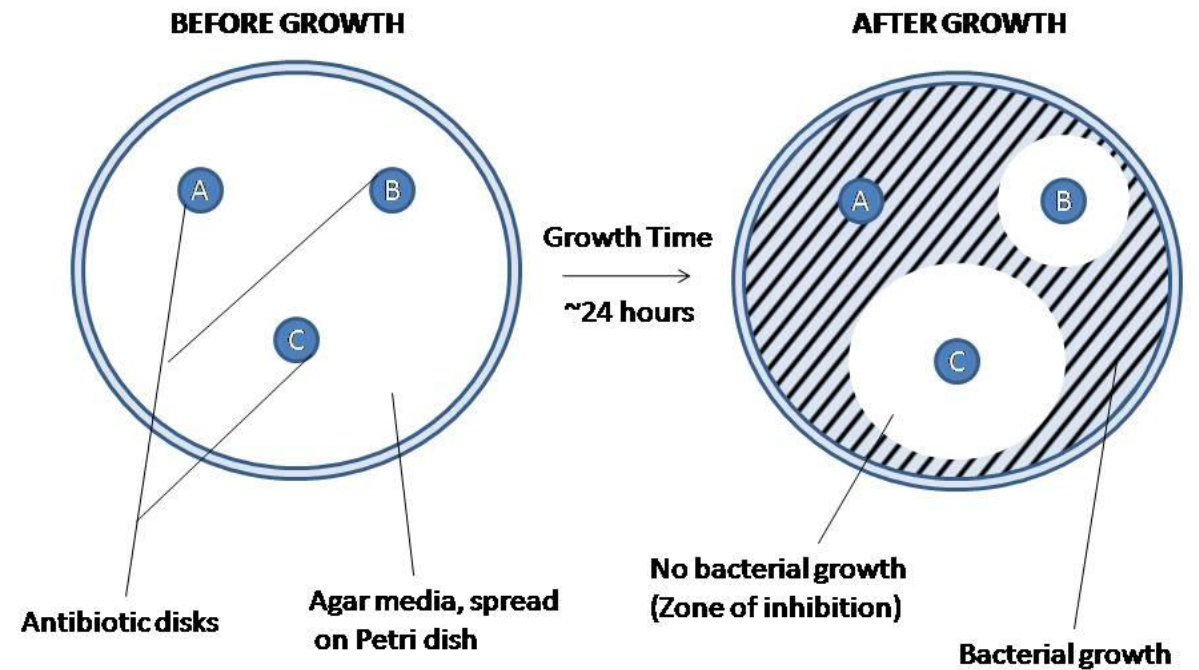
**FAILURE
IS NOT
THE OPPOSITE OF
SUCCESS. IT IS
PART
OF SUCCESS.**

Failure as part of the university experience

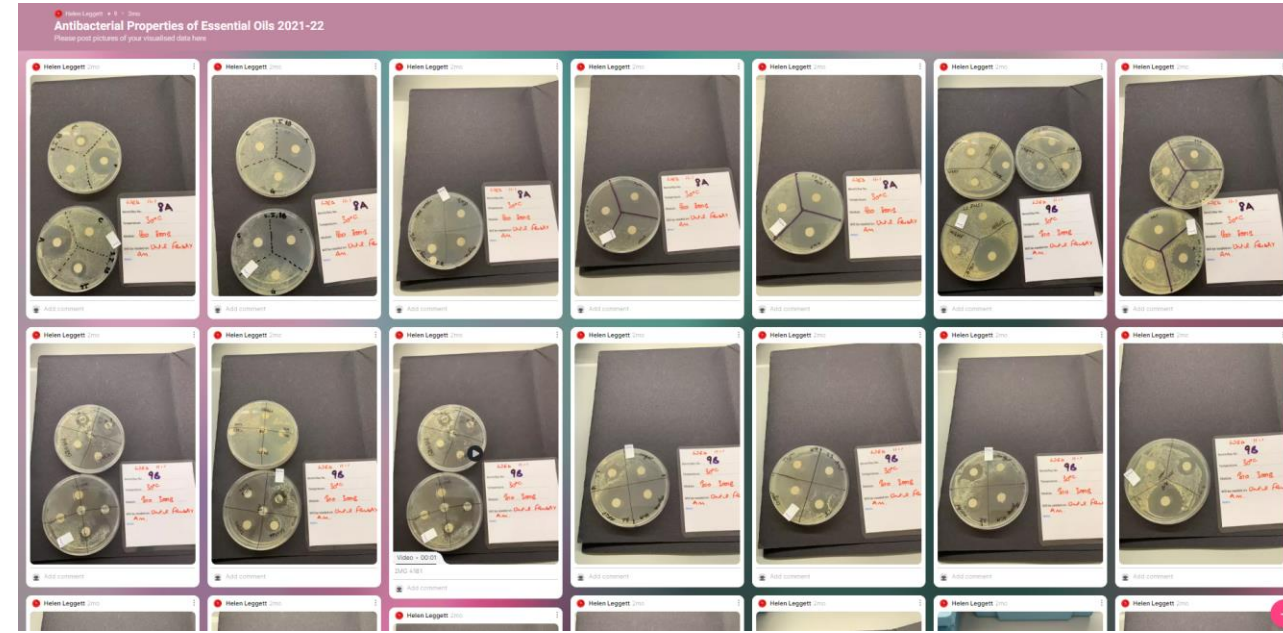
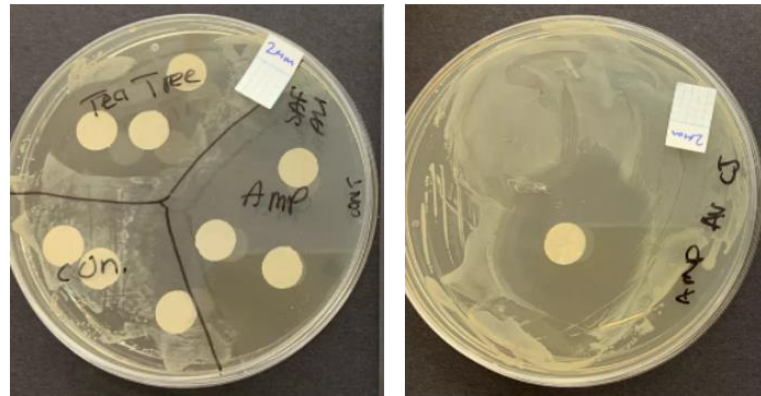
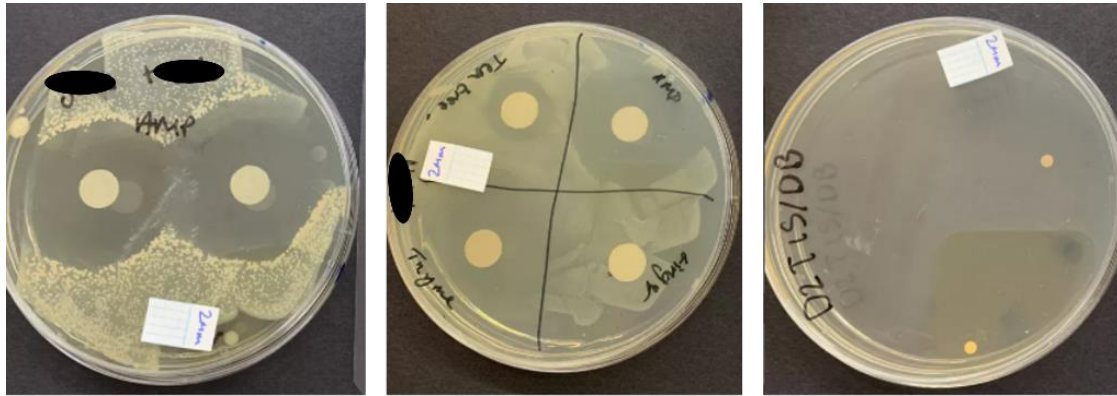
- University is full of opportunities to try something new
- Inevitably this may sometimes lead to failure
- Experiencing failure is a powerful learning opportunity
- Reflecting on failure can result in a deeper understanding and awareness of knowledge gaps and areas for future improvement
- Combined with active and/or experiential learning leads to a powerful learning opportunity

Design an experiment to test whether essential oils have antibacterial properties

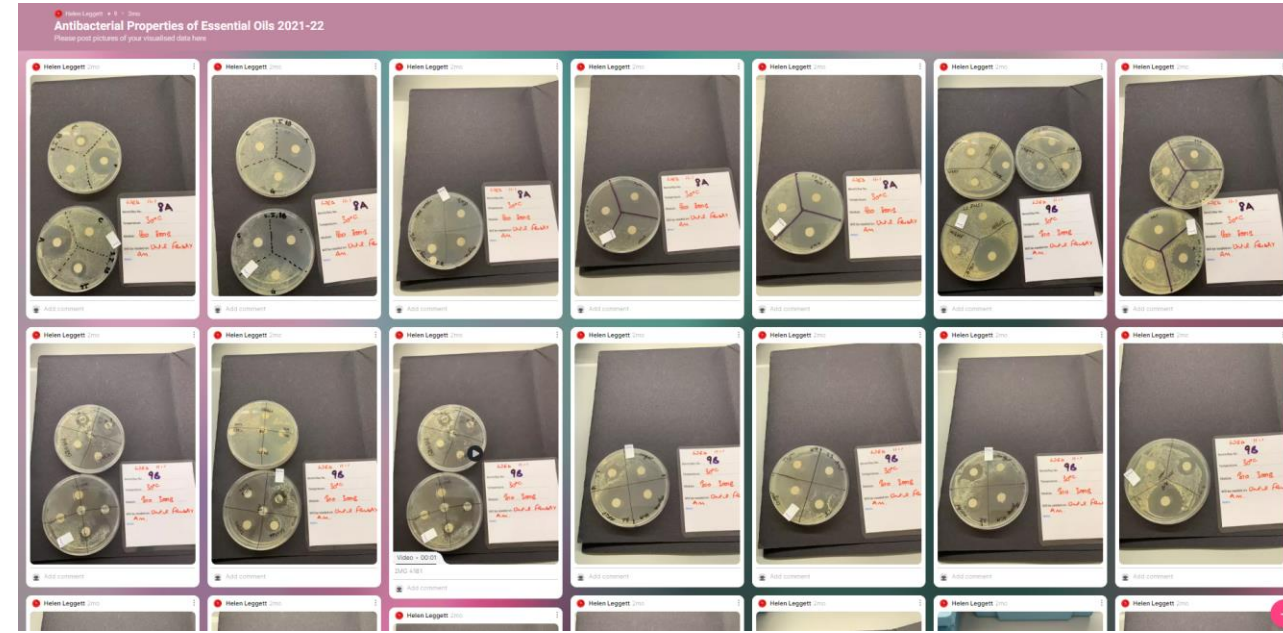
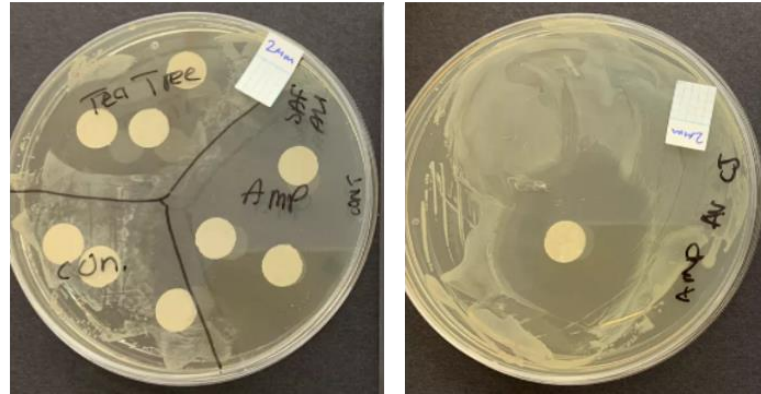
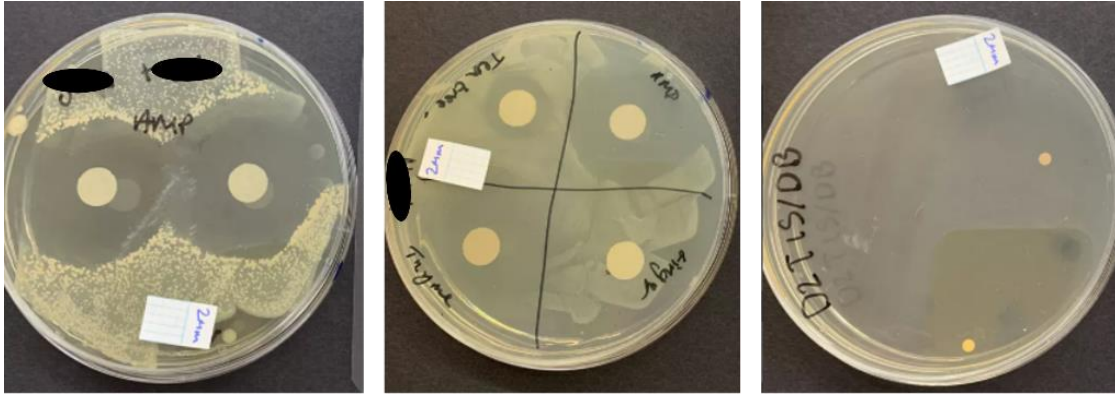
- The purpose of this study is to determine the antibacterial properties of Essential Oils (EOs) against *E.coli*.
- Antibacterial activity of EOs can be determined by the 'disk diffusion method' by measuring inhibition zone diameters.
- Working in groups of 4s



The approach taken and results were variable.



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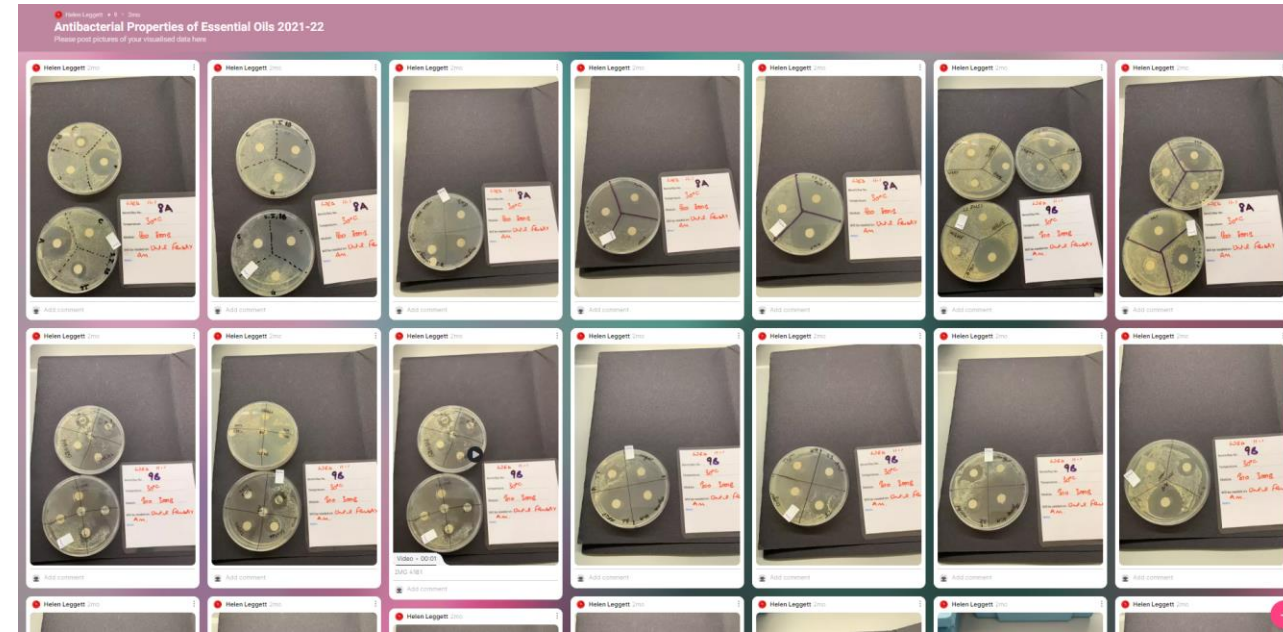
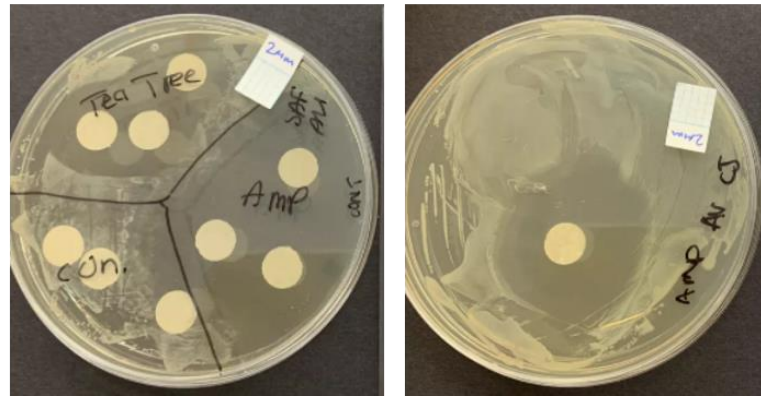
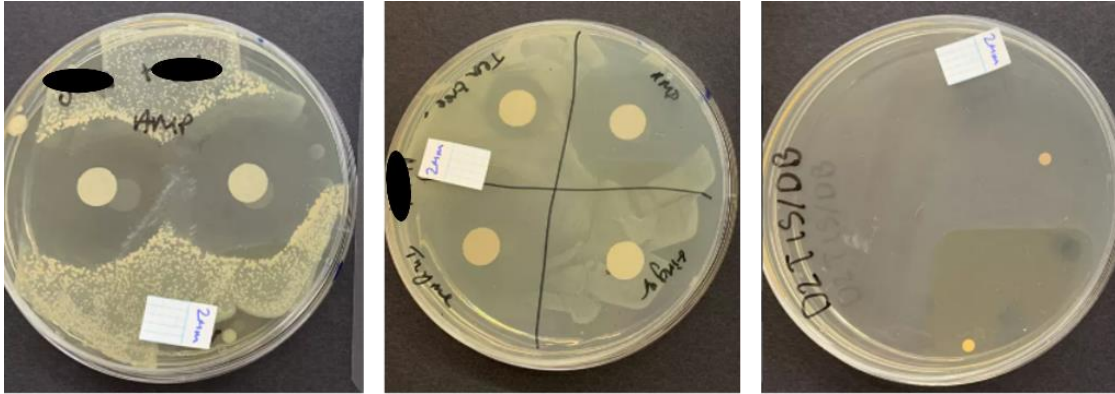
Why do these plates all look different?

Why are there a different number of disks on each plate?

Why are the plates all labelled differently?

Why are there clear inhibition zones around some disks and not others?

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Why do these plates all look different?

Why are there a different number of disks on each plate?

Why are the plates all labelled differently?

Why are there clear inhibition zones around some disks and not others?

You are more likely to remember what you think about so we guided students to *think* about their results...

“Memory is the residue of thought.”

“You remember what you think about.” DT Willingham 2021

1. What is a *t*-test?

Today we are going to see if the means of the zones of inhibition data that you collected in the first Essential Oils experiment for garlic and cumin seed, are significantly different.

If they are significantly different this means that one of the oils has a greater effect on *E.coli* growth, than the other.

Population 1 = Zones of inhibition for discs containing garlic

Population 2 = Zones of inhibition for discs containing cumin seed

What is the aim for our experiment?

4. Analysing your results

The aim of the experiment we carried out with the Essential Oils was....

To determine the antibacterial effect of garlic and cumin seed on the growth of *E.coli*

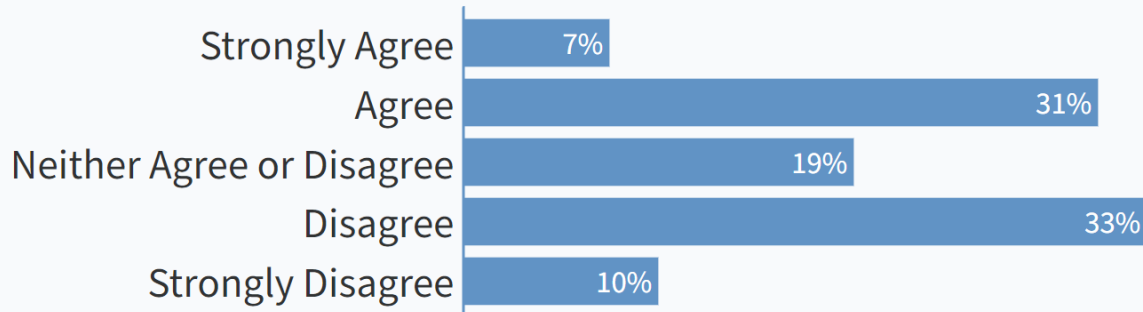
We should now be able to write a good conclusion....



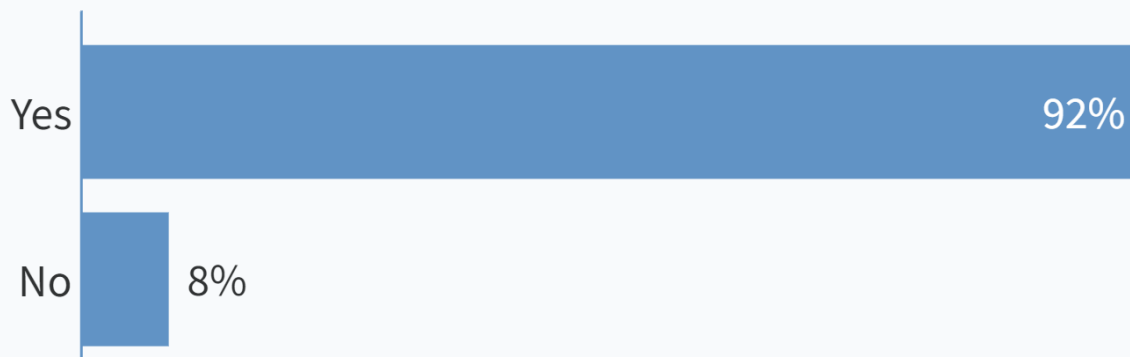
And we asked students to reflect on the process....

Pre-practical confidence was variable. Students reported developing a range of skills during the practical.

**I was concerned about failing the Essential Oils practical
(select the most appropriate answer for you for this
statement)**

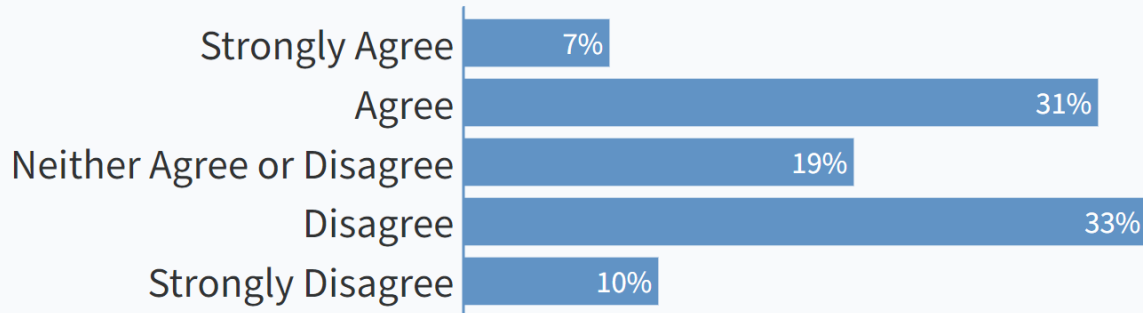


**Did the Essential Oils practical offer you a safe space in
which to experiment with science?**

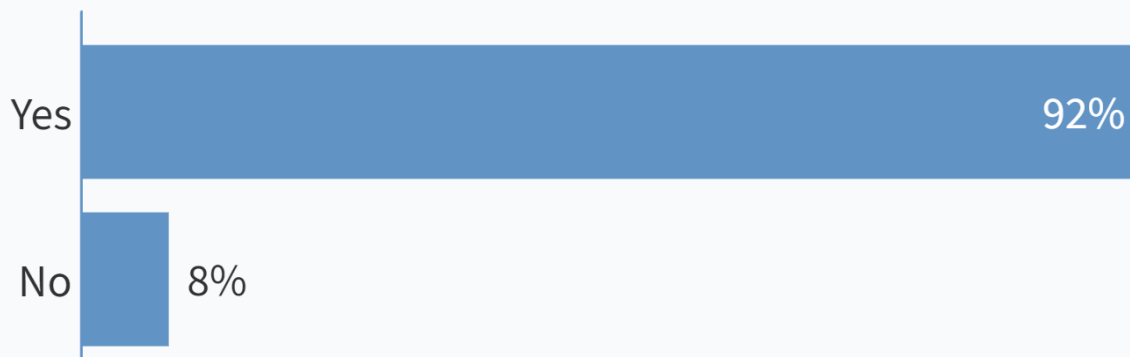


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Many students requested another attempt at the experiment. We arranged this for SEM2.

Lessons learned...

- Students told us that the practical increased their confidence and reduced anxiety within the lab
- Deliver the practical in exactly the same way – it required team-working, decision-making, practise with scientific method, research of the literature, note-taking etc.
- Introduce pre- and post-practical skills assessment to inform reflection and follow-up activities
- Students struggle to see reflection as a positive activity. So build resources to support and guide their reflection and to see reflective practice as a positive.
- By asking to repeat the practical, students were acknowledging that there was room to improve and wanted the chance to try again