Evaluating the benefits of virtual training for students

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Laboratory classes for Bioscience students

- Requirement professional bodies and employers
- Range of laboratory competencies of new students
- Work in groups and may not all fully engage
- Students are only allowed in during timetabled classes

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Access to highly specialised scientific equipment

- Highly diverse student body
- Cost of consumables and scientific equipment…
- Restricted access and specialist training required
- Space in smaller laboratories
- Risk assessment, health and safety
- Challenge for distance learning students
- **Make accessible for all students**

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Methods used in this ongoing study

- Likert-type surveys
  - Deployed directly after Labster completion
  - Deployed as part of module teaching

- Small group or individual interviews
  - with undergraduate students
  - with life science academic teaching staff

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Could virtual laboratories increase student understanding and engagement within modules?

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Labster virtual simulations

Real world scenario / story

Enter virtual lab

Tackle the problem

Actions and questions to answer

Theory to read

Media to watch

Students advance through by completing actions and answering questions – if answer is wrong they can read theory and reattempt the question. They have a running score and progress bar.

Can the virtual simulations help to train all students for laboratory work, including lab safety?

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4BICH001W Biochemistry – Lab safety skills

Orientation week
Health and safety talk

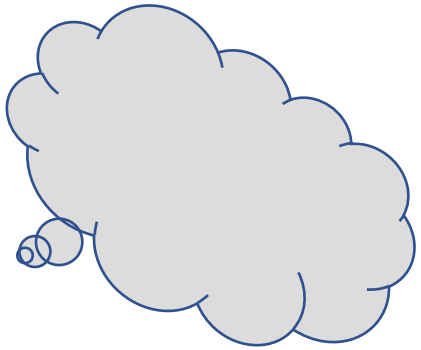
Labster Health and Safety simulation

Lab safety briefing
Practical class 1
(week 4, semester 1)

Lab safety briefing
Practical class 2

Lab safety briefing
Practical class 3

Lab safety briefing
Practical class 4



Lab skills practical exam end of semester 2

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From: https://www.labster.com/simulations/lab-safety/ 10/1/18 with permission

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Using the virtual simulation to create a lab accident….

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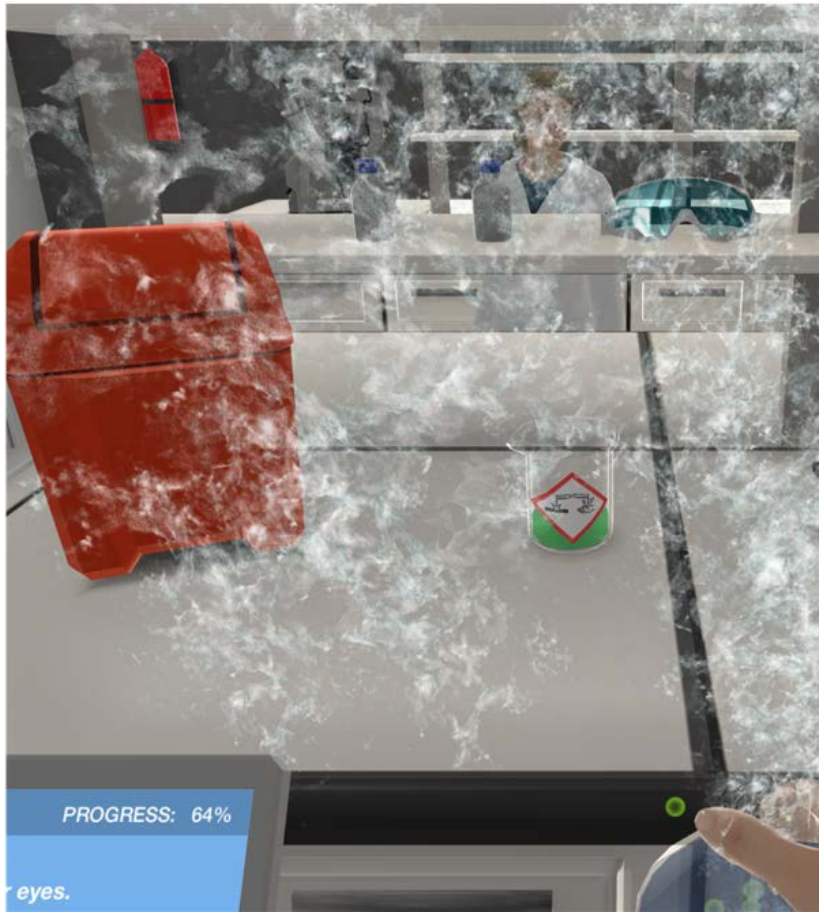
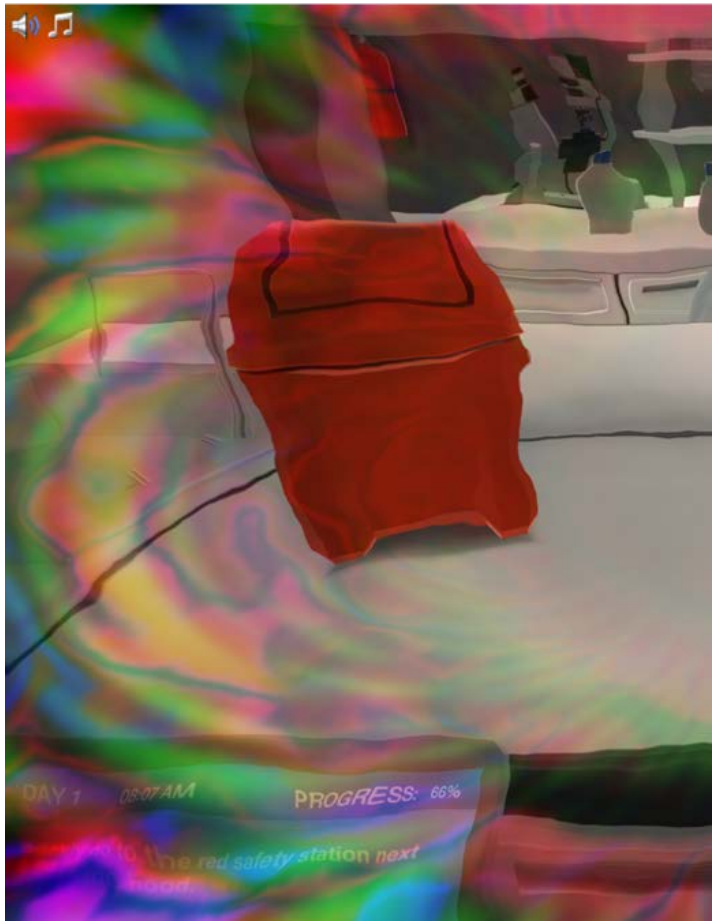
4BICH001W Biochemistry – Lab safety



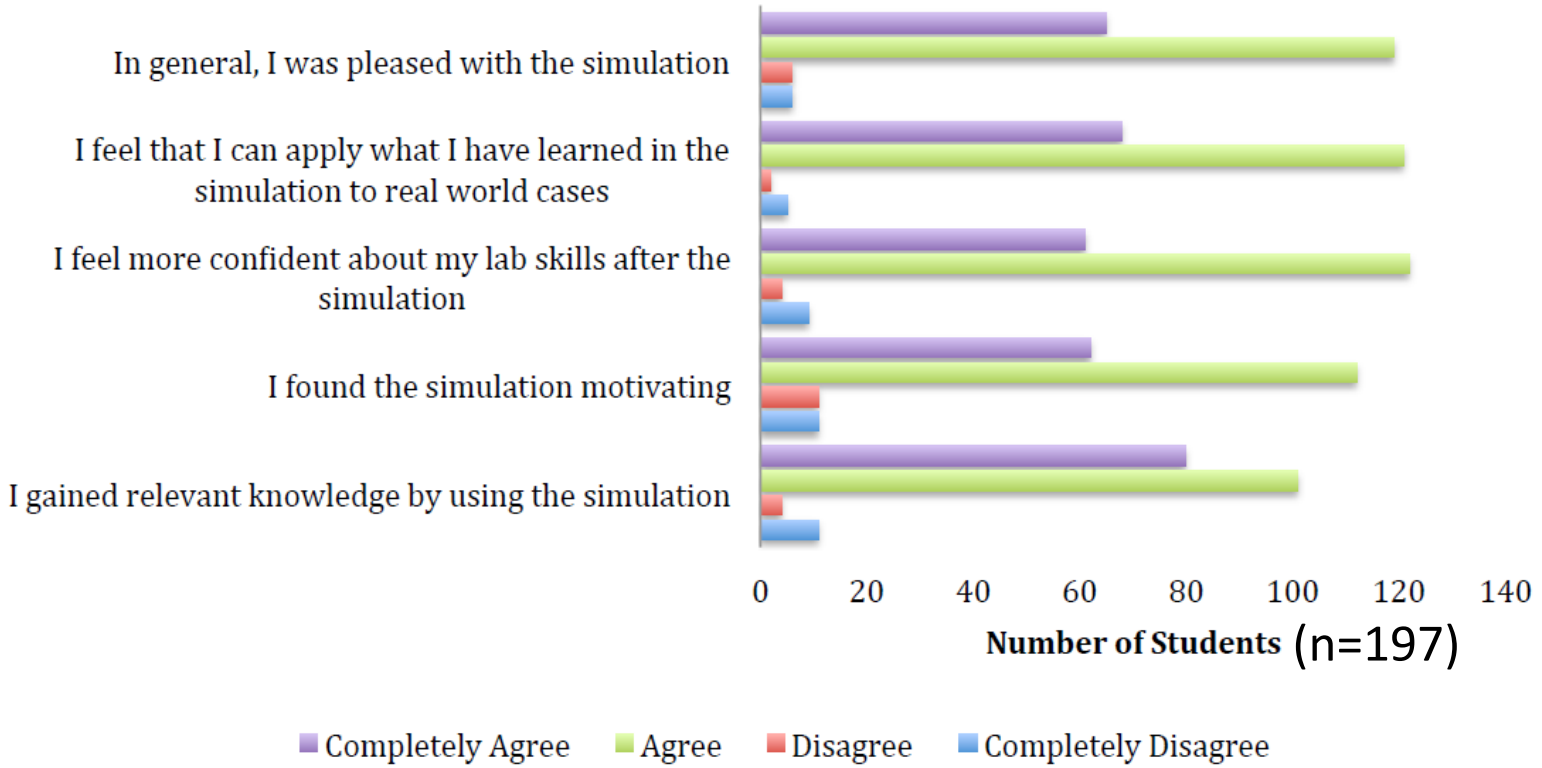


LABSTER

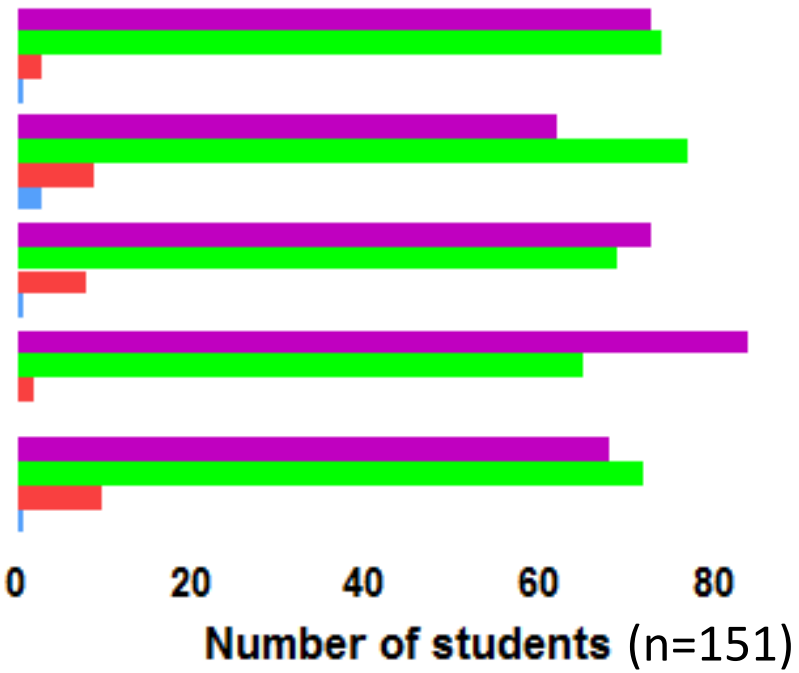
From: https://www.labster.com/simulations/lab-safety/ 10/1/18 with permission

4BICH001W Biochemistry – Lab safety immediate evaluation

2016-17 cohort



2017-18 cohort



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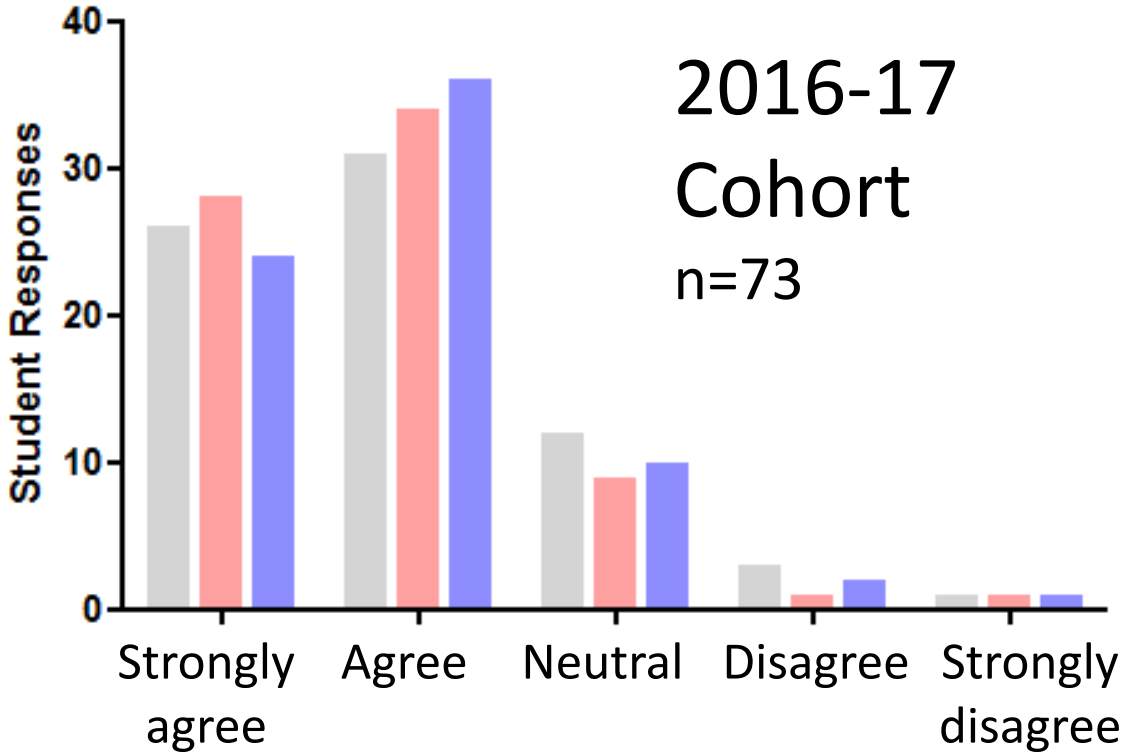
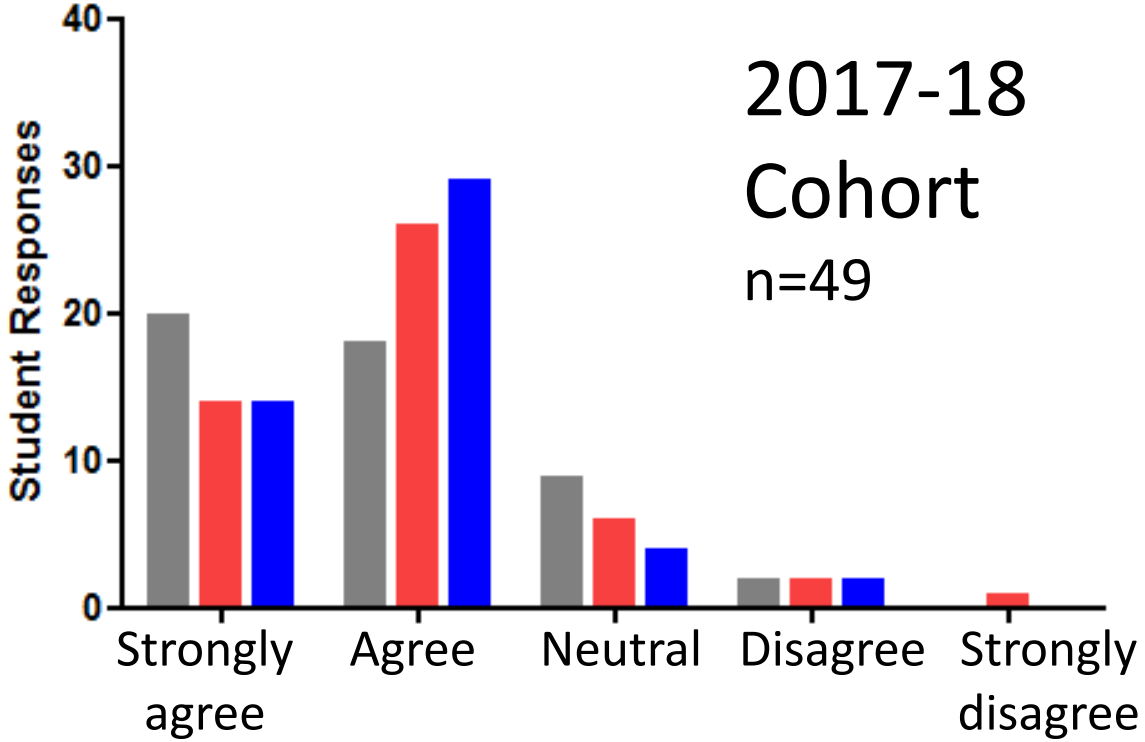
4BICH001W Biochemistry – Lab safety

Learning objectives were clear
Content was organised and well planed
Progression through VP was appropriate



2016-17 Cohort
n=73



2017-18 Cohort
n=49

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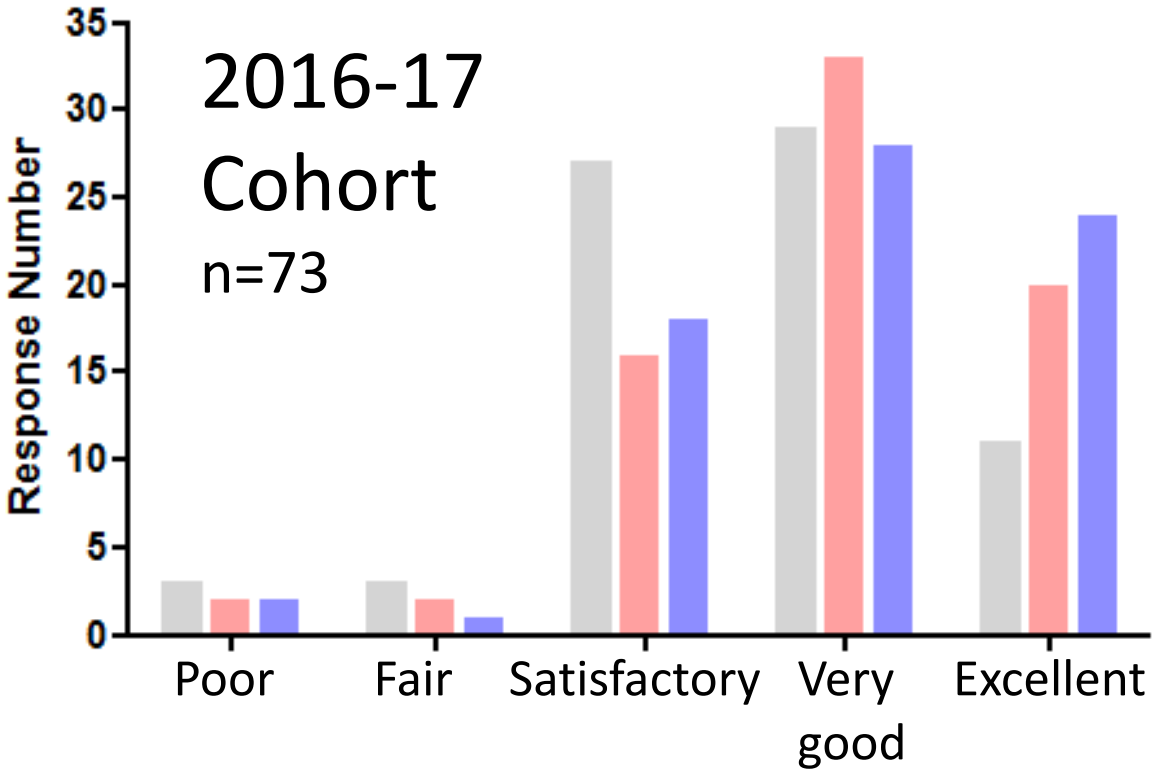
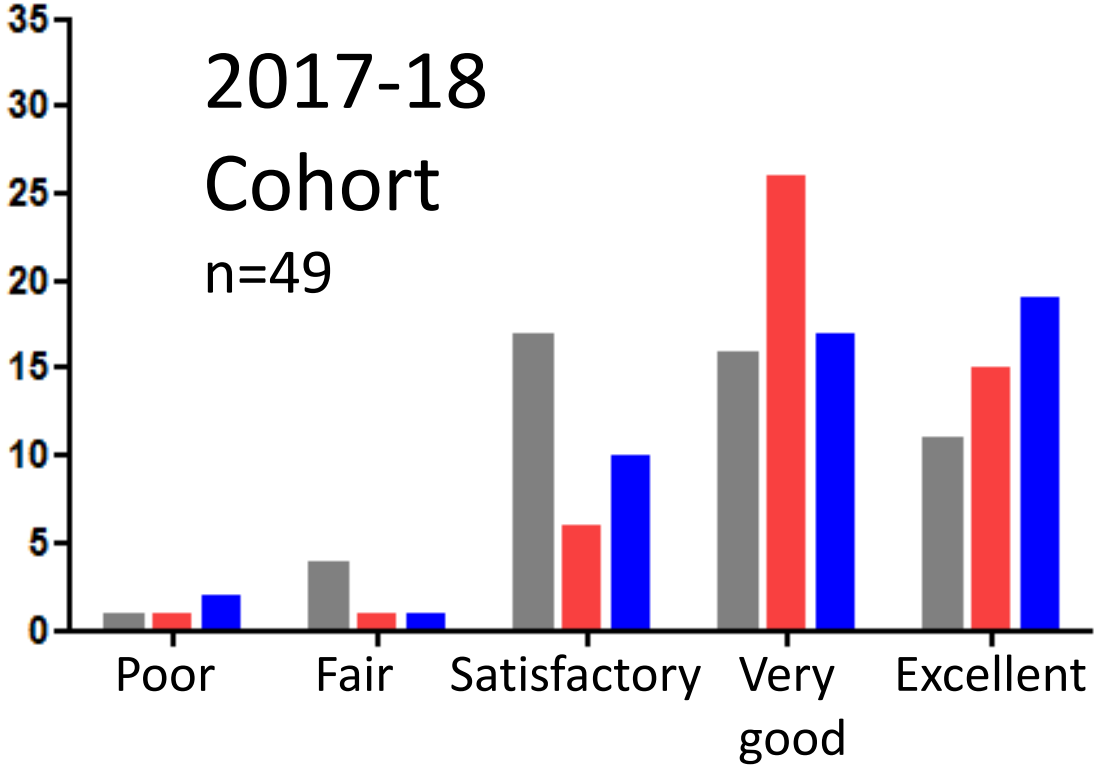
4BICH001W Biochemistry – Lab safety

Time taken to complete virtual practical was appropriate
Skills/knowledge gained from virtual practical
Overall usefulness of virtual practical





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Summary 1

- Students have found the simulations interesting
- They have indicated that the simulations have enhanced their understanding
- Not all students completed the simulation
- Nor did all complete survey

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Has the virtual laboratory simulation assisted longer term learning?

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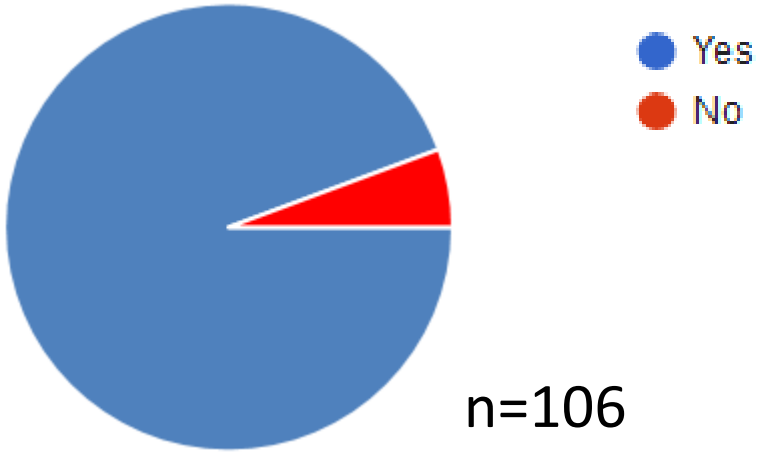
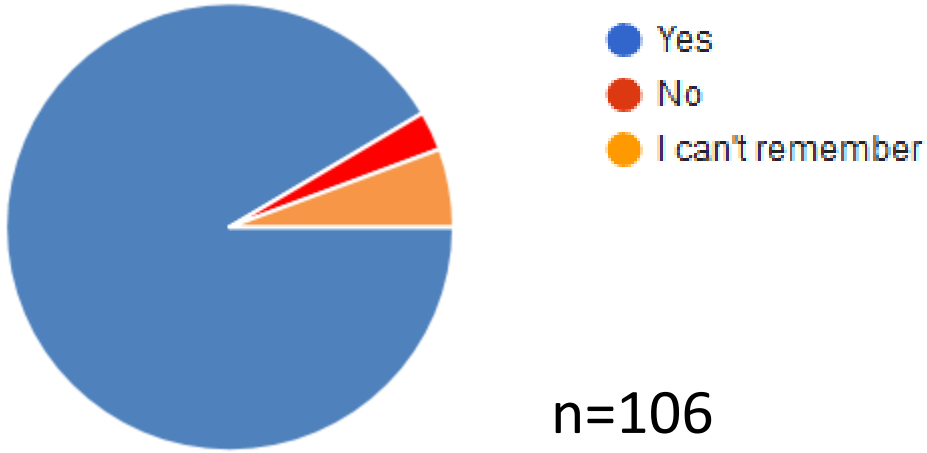
Questions to Level 5 students about Health and Safety training one year after the level 4 simulation…

Did you take 4BICH001W Biochemistry in level 4?



n=106

In 4BICH001W Biochemistry you were asked to complete the Labster Health and safety simulation. Did you do this?



n=106

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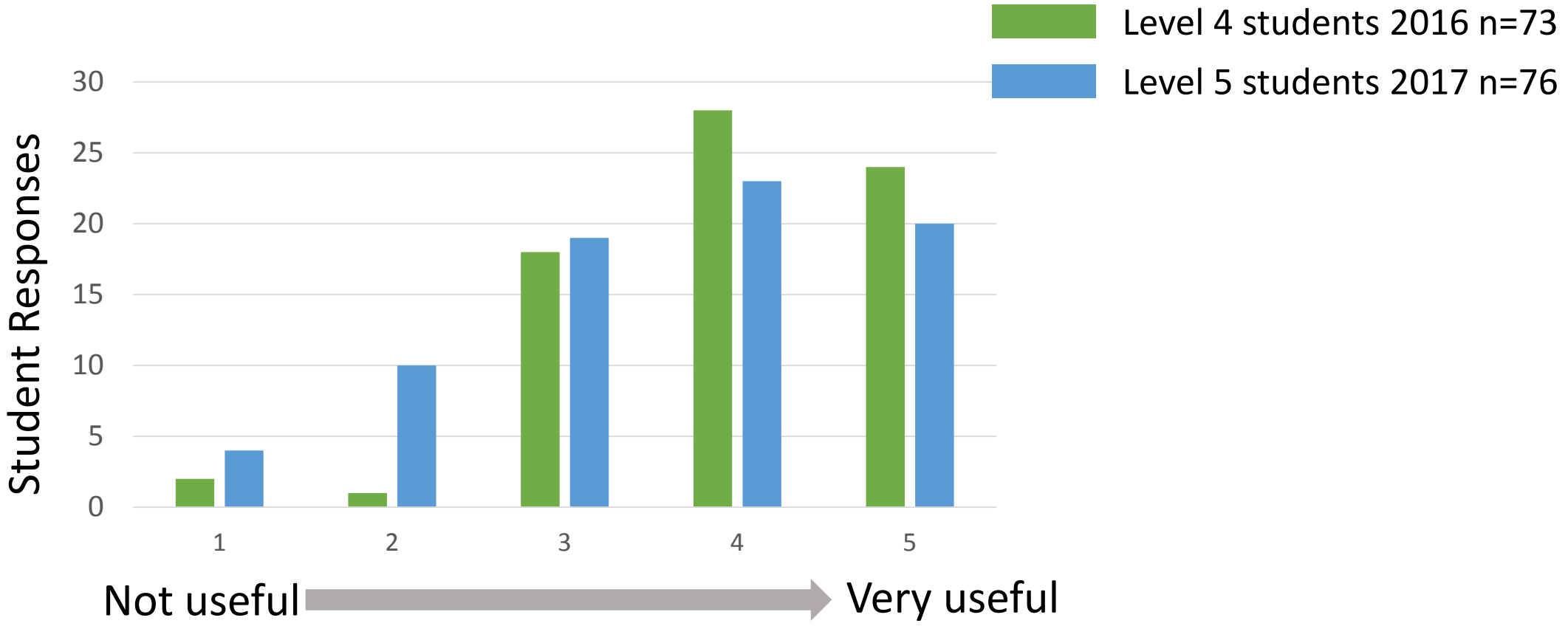
Evaluating if the Labster virtual simulations had been useful



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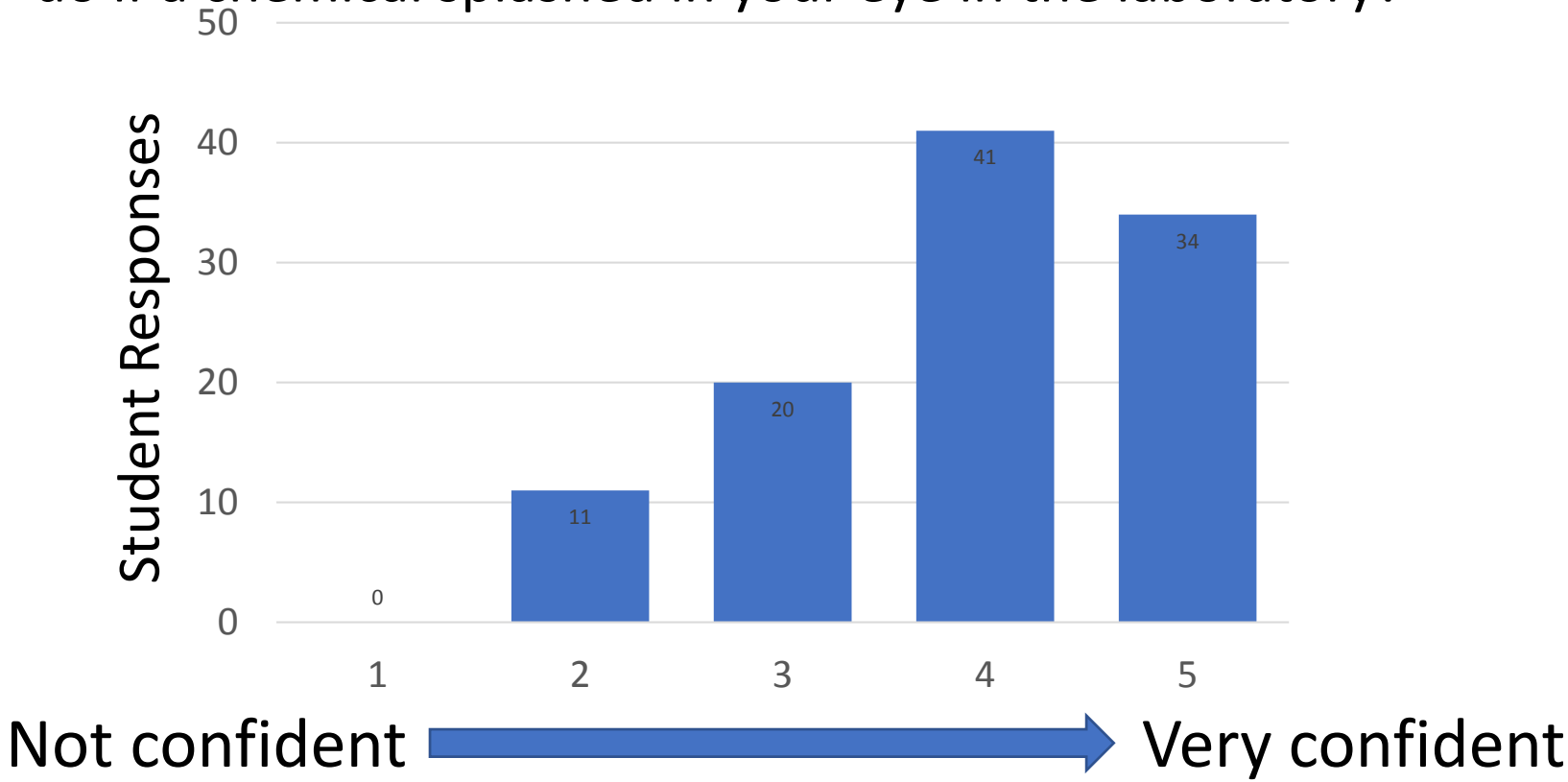
How much information from the simulation can the students recall after 1 year?

At the start of level 5, how confident are you about knowing what to do if a chemical splashed in your eye in the laboratory?



Level 5 students, n=106

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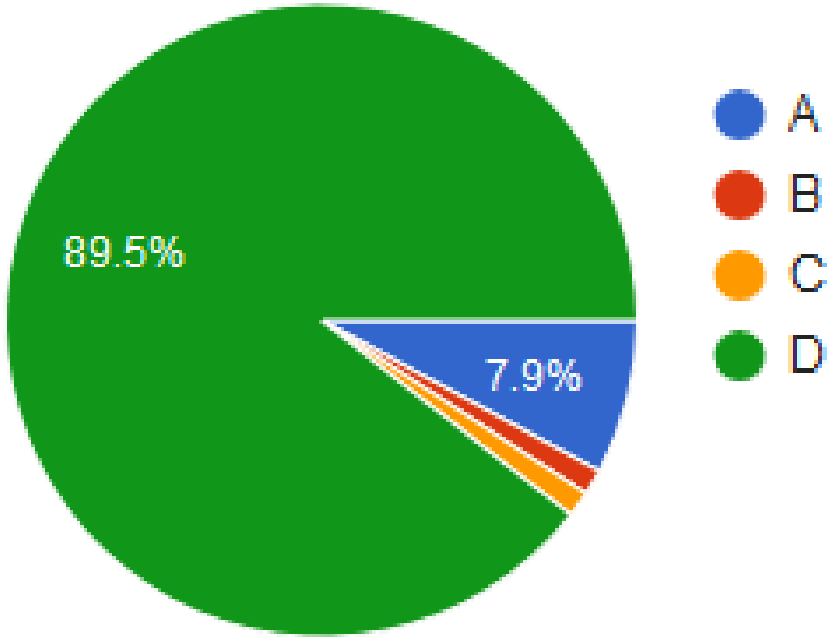
From: https://www.labster.com/simulations/lab-safety/ 10/1/18 with permission

Which of these hazard symbols is for an oxidising reagent?

Which of these safety symbols is for an oxidising reagent?



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Has confidence in Health and Safety increased following the virtual laboratory simulations?

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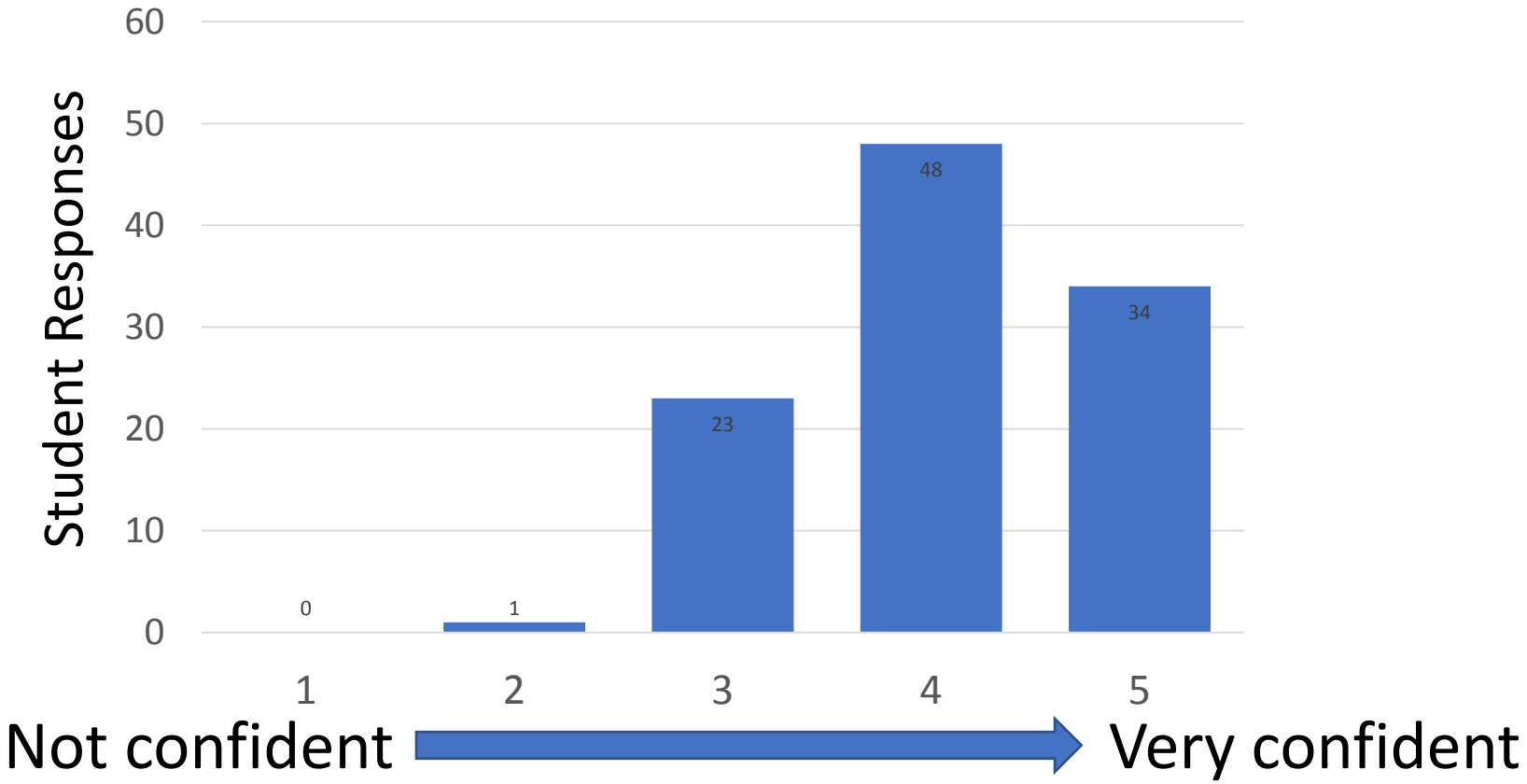
How confident are you about Health and Safety?



Level 5 students, n=106

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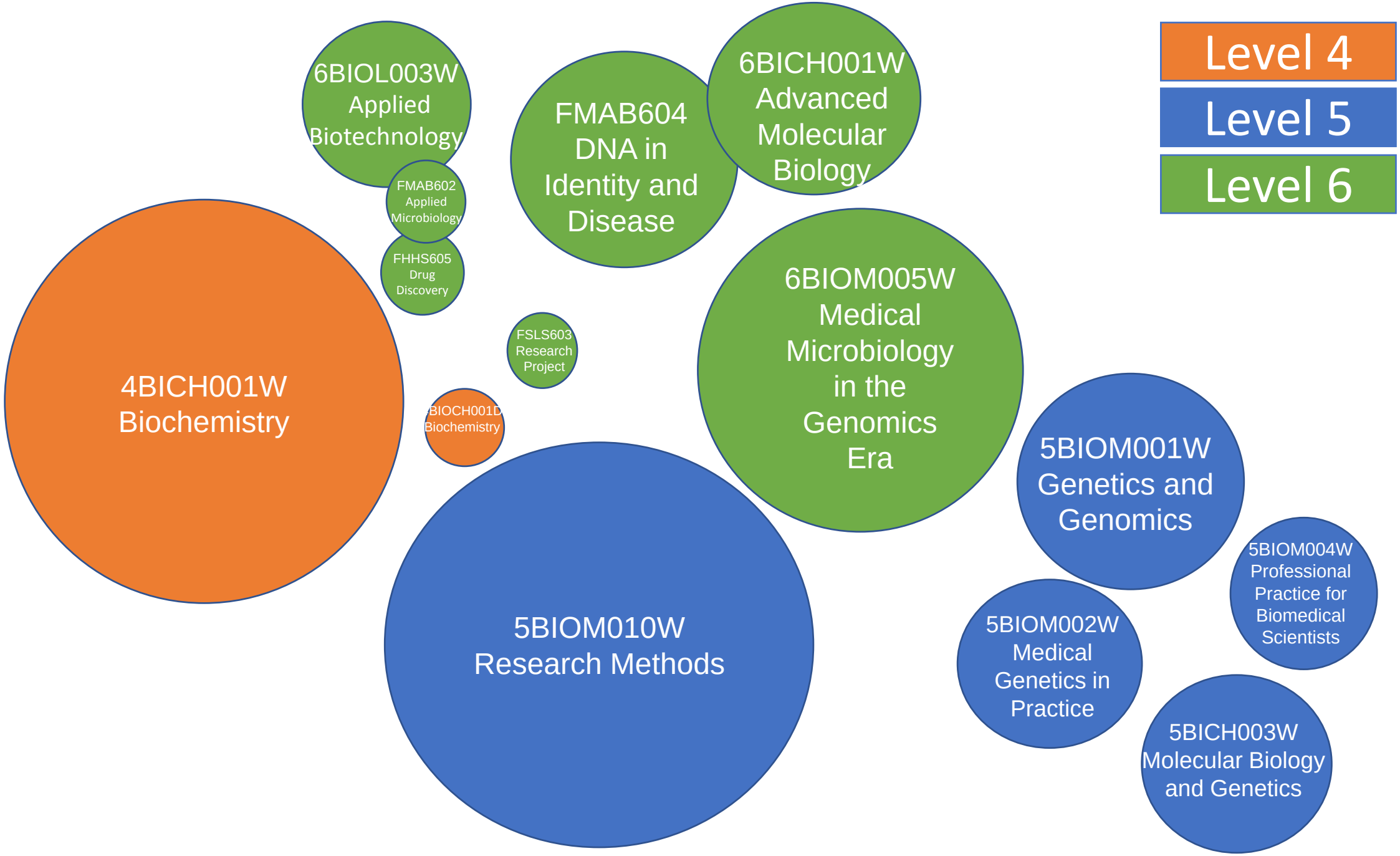
Level 4
Level 5
Level 6
6BIOL003W Applied Biotechnology
FMAB602 Applied Microbiology
FHHS605 Drug Discovery
FMAB604 DNA in Identity and Disease
6BICH001W Advanced Molecular Biology
4BICH001W Biochemistry
FSLS603 Research Project
BIOCH001D Biochemistry
6BIOM005W Medical Microbiology in the Genomics Era
5BIOM010W Research Methods
5BIOM001W Genetics and Genomics
5BIOM004W Professional Practice for Biomedical Scientists
5BIOM002W Medical Genetics in Practice
5BICH003W Molecular Biology and Genetics

Students Comments

Liked I could access when and where ever…in free time or at uni, even during holidays

Useful as a practice before doing a practical. The virtual activities should also be done physically so that the concepts are put into practice

Better for formative assessment, perhaps not summative due to some technical issues

Very time consuming and does not equip you sufficiently for real life lab work

Used Labster to support other study materials provided in order to reinforce learning

Can go back and repeat as many times as you like

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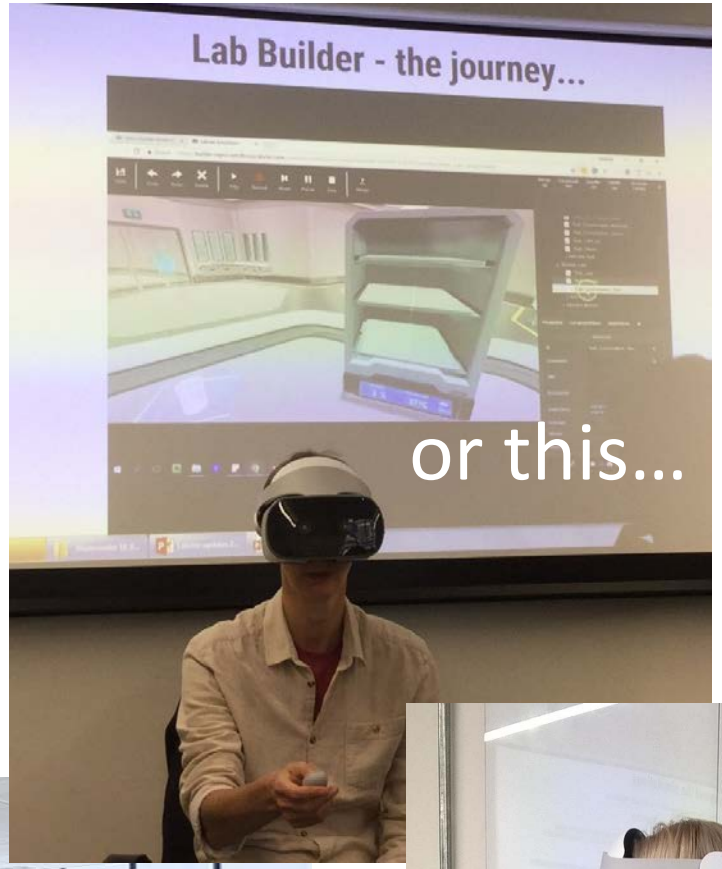
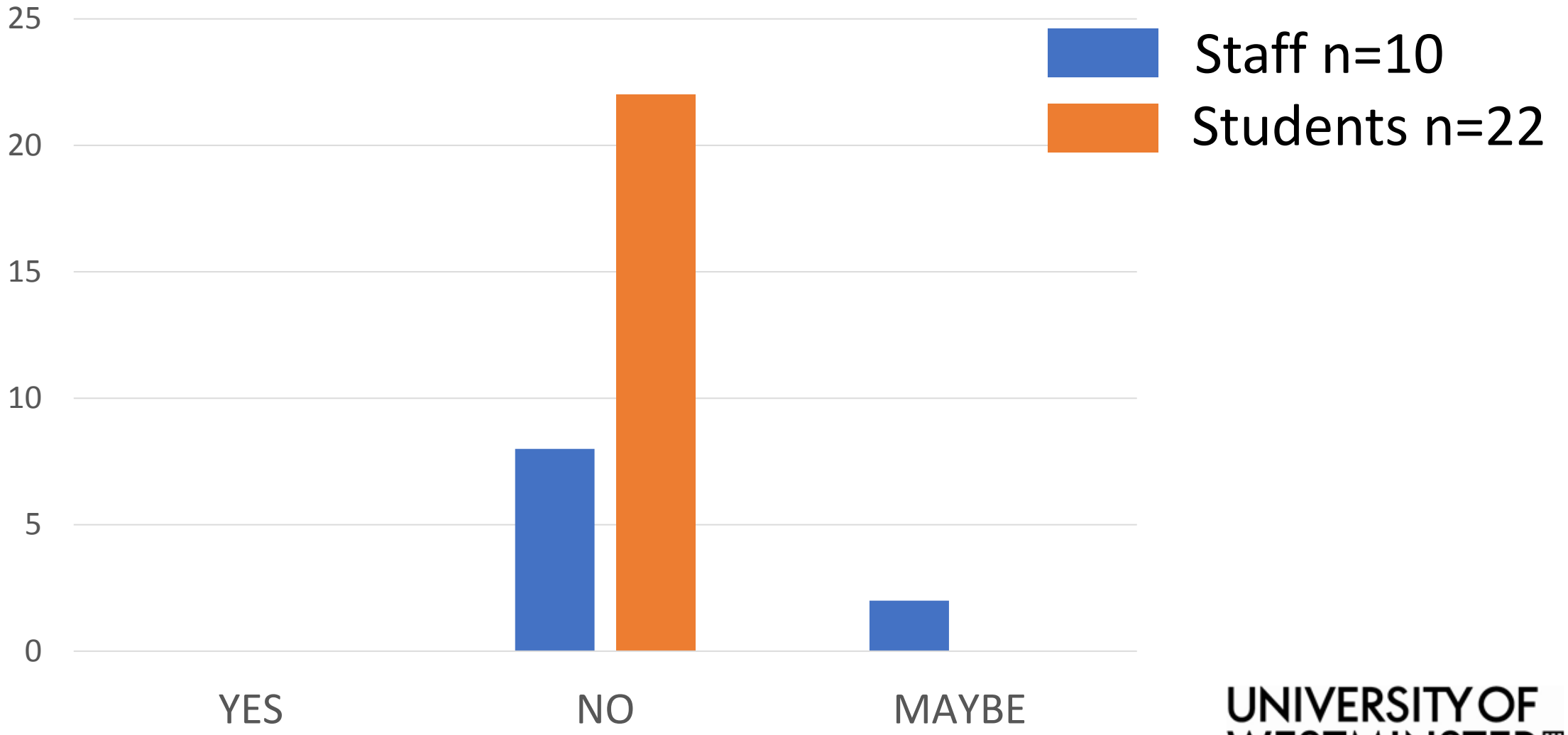
Could this…
DAY 1
08:01 AM
PROGRESS: 14%
Click your way around the lab to identify the safety hazards.


Lab Builder - the journey…
or this…


Replace this?

Should virtual labs replace actual laboratory sessions?



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Conclusions

- Most students reported that the use of virtual simulations increased understanding.
- There is evidence that the impact of the simulations is long lasting and that students have assimilated this knowledge.
- Virtual simulations were rated well to support learning but not replace laboratory classes.

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