Face-to-Face Lab Teaching in an Age of Pandemic: Tragedy, Triumph and the Student Voice

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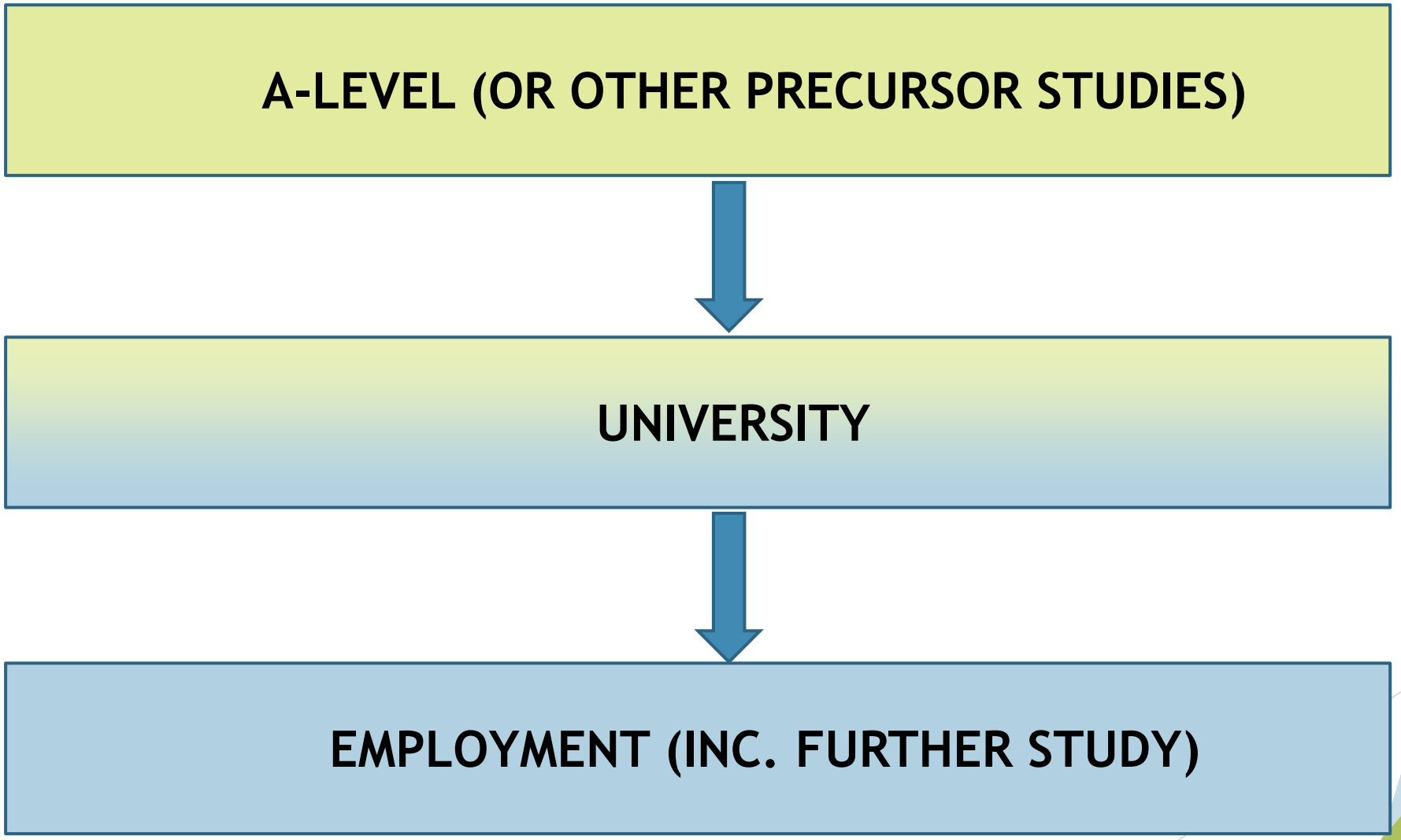
The two key transitions



Brief summary of previous work

- New A-level syllabus with 12-experiment minimum & competency assessment – must redesign Level 1 lab course to match (not reinvent the wheel - student confidence in course)
- Feedback from students and demonstrators showed greater confidence/independence from students
- Redesign course around less 'hand-holding' and 'spoon-feeding'
- Pedagogic research – surveys and focus groups

"Transitions in University Lab Teaching in an Age of Pandemic", Anderson, T., *New Perspectives in Science Education*, 2021. DOI: 10.26352/F318_2384-9509 PDF link: 7160-CHEM5014-FP-NPSE10.pdf (pixel-online.net)

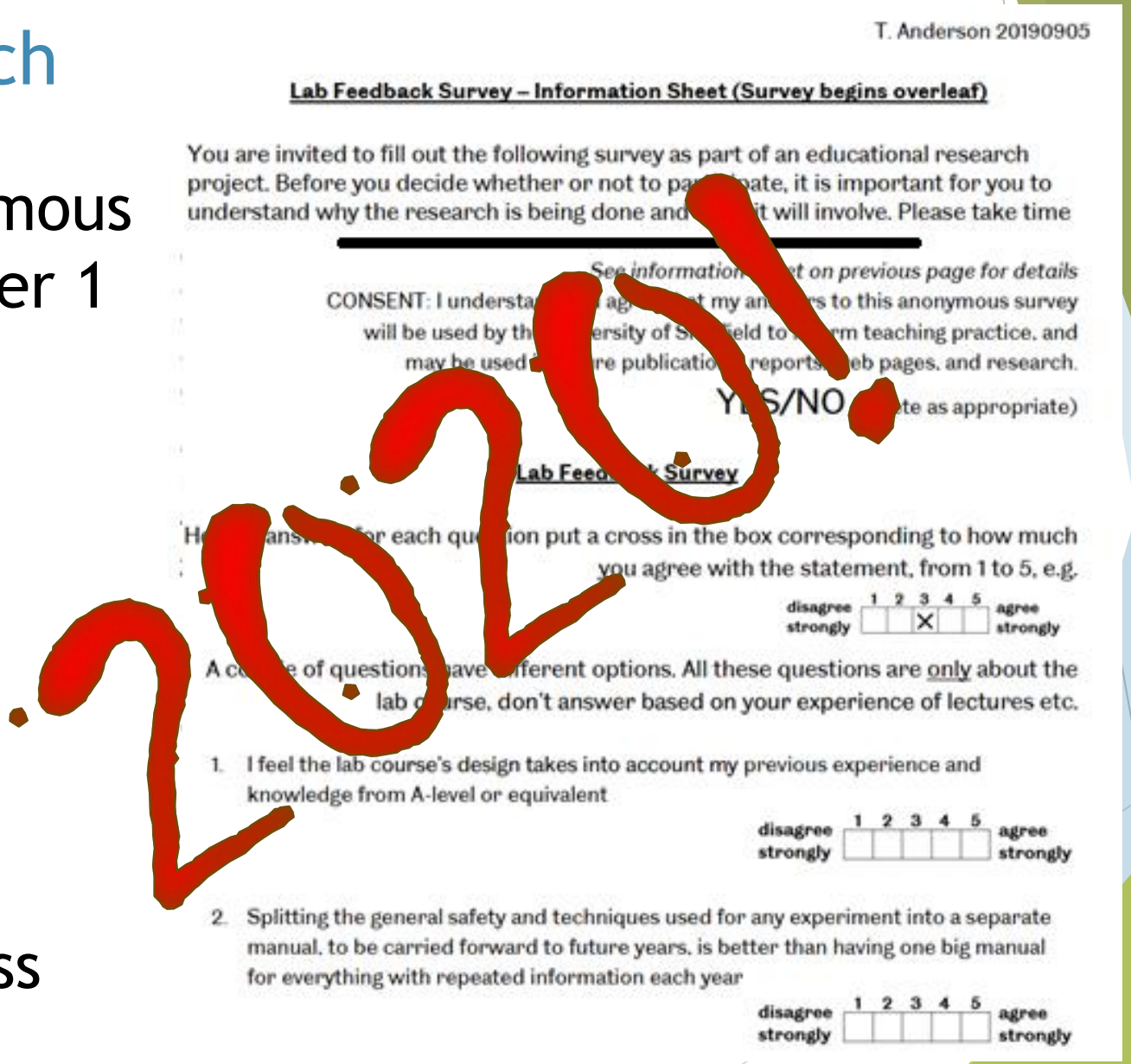
Pedagogic research

- Conducted anonymous surveys in Semester 1

- Planned to follow these up

with focus groups in

Semester 2 to discuss results…



T. Anderson 20190905

Lab Feedback Survey – Information Sheet (Survey begins overleaf)

You are invited to fill out the following survey as part of an educational research project. Before you decide whether or not to pa[illegible]ate, it is important for you to understand why the research is being done and [illegible]t will involve. Please take time

See information sheet on previous page for details

CONSENT: I understa[illegible] ag[illegible]t my an[illegible]rs to this anonymous survey will be used by th[illegible]ersity of S[illegible]eld to [illegible]rm teaching practice, and may be used [illegible]re publicatio[illegible] reports[illegible]eb pages, and research.

YE[illegible]S/NO [illegible]te as appropriate)

Lab Feed[illegible]k Survey

H[illegible] ans[illegible]r each qu[illegible]ion put a cross in the box corresponding to how much you agree with the statement, from 1 to 5, e.g.

disagree strongly | 1 | 2 | 3 | X | 4 | 5 | agree strongly

A co[illegible]e of questions gave [illegible]fferent options. All these questions are only about the lab c[illegible]urse, don't answer based on your experience of lectures etc.

1. I feel the lab course's design takes into account my previous experience and knowledge from A-level or equivalent

disagree strongly | 1 | 2 | 3 | 4 | 5 | agree strongly

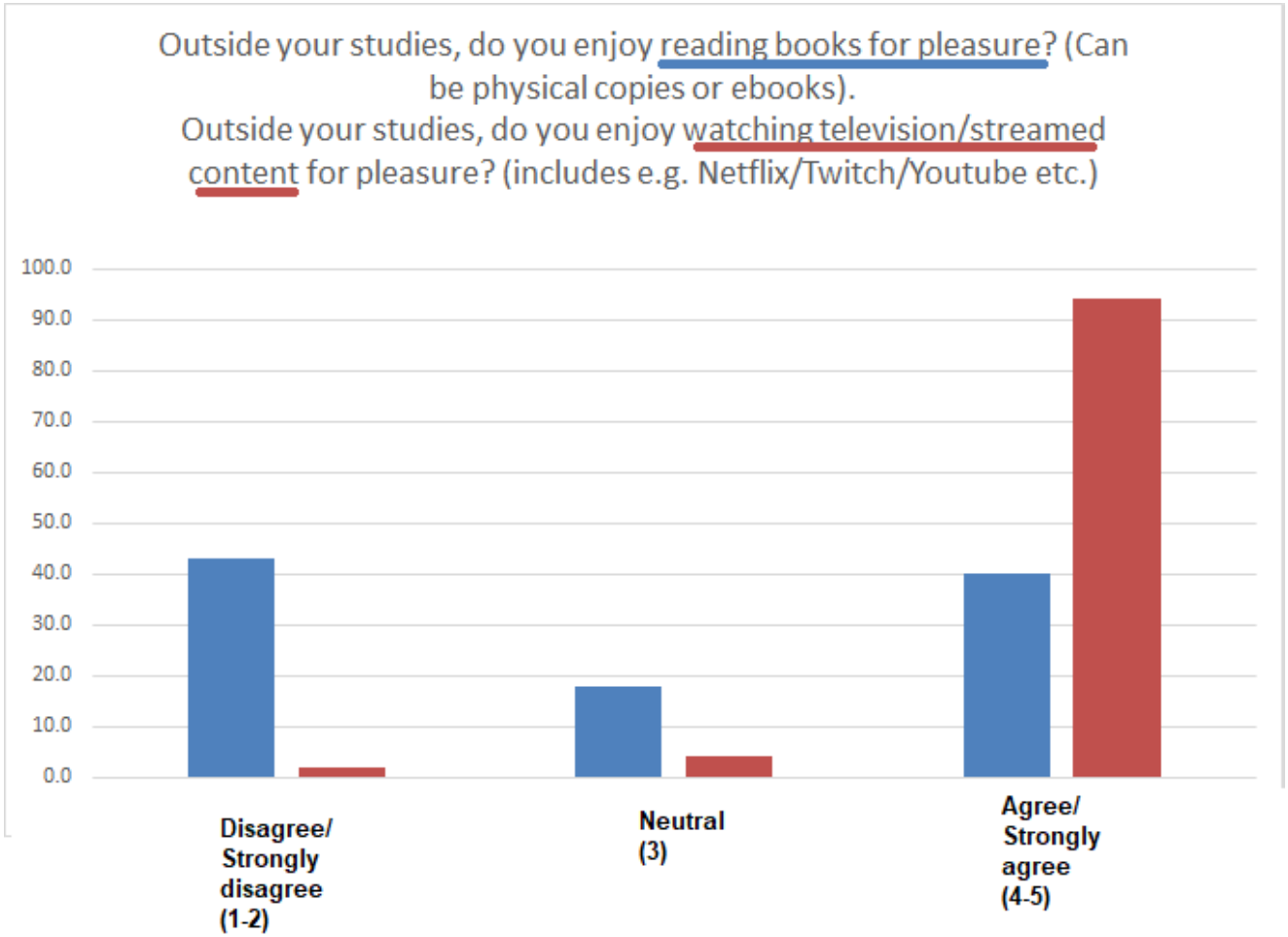
2. Splitting the general safety and techniques used for any experiment into a separate manual, to be carried forward to future years, is better than having one big manual for everything with repeated information each year

disagree strongly | 1 | 2 | 3 | 4 | 5 | agree strongly

2020!

Are students still “scholars”?

Students were enthusiastic about more concise laboratory manuals. Why?



2020-21 Survey by T. Anderson. N=50 (71% response rate), using an anonymised paper survey approved by the University of Sheffield’s ethics approval process. Further details available on request.

Focus Group

"…if you haven't done anything at A level where you've had to read, like, you know, some people do English A level and they have to read certain books and then some people don't do that and don't touch a book because they're too busy living their social lives and doing other stuff, and then also from then, the only time that you've probably read is at GCSE"

"I never really read, like, fictional books for pleasure. It just, I just never really engaged me in a way that I really enjoy or any time that I did I'd dedicate like an hour or two hours to just sit and read. And that just seems a little boring for me. And usually when I read anything it's more articles or just web pages online, just random things online."

So what about electronic textbooks, is that better?
"I prefer physical copies to e-books"
"I hate reading from tablets, I much prefer to read from a physical book"

Not a solution!

“They all just look up tutorial videos on Youtube for things now”

Focus group: to do a real life activity like a new chore or a repair, would you look up a video or a text list of instructions?

“I'd definitely say a list of instructions, I absolutely hate watching tutorial videos, I don't know what it is, but … hate when the only thing that comes up is tutorial videos. I just want a list and just says, please do this, this and this. OK, go and do it. But I hate just wasting my time just watching, what, 20 minutes of tutorial when I can read it in like three minutes and have it done.”

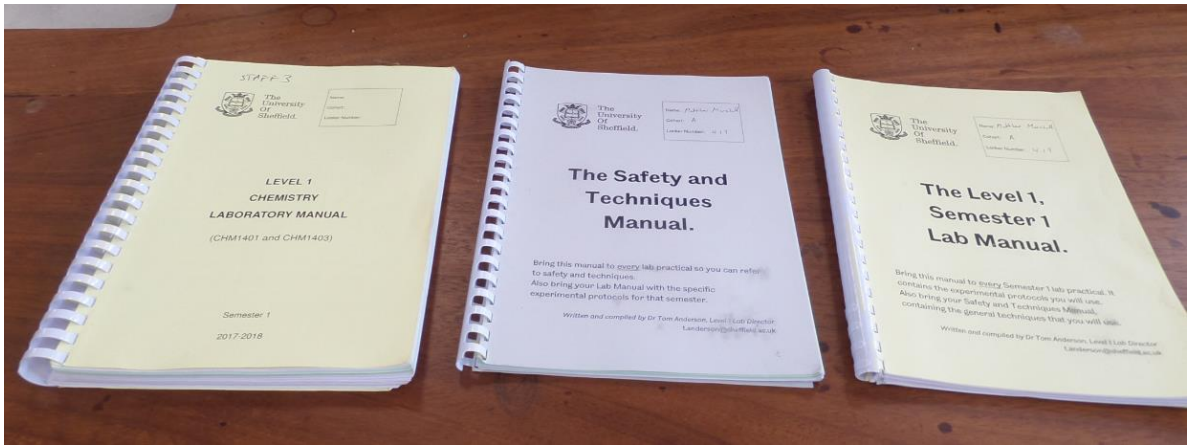
“I'd have to probably go for a video version because I'm, I learn a lot more audio wise, video wise…”

“I[t] really depends on what it is … say it was a maths problem … I'd prefer a video explaining it was explained, but say it was just like a chore or something, probably just a list or maybe a happy medium of a list with pictures.”

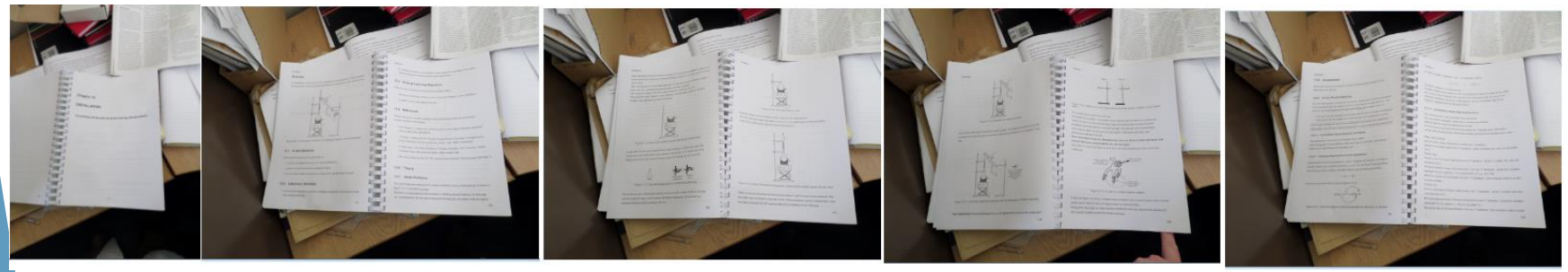
What is the best way to communicate information and maintain skills development continuously?

- The lab manuals I inherited were very lengthy (270 pages per semester) – every time a student asked a question, the answer was added in again by my predecessor…
- There is no point in everything being in there if the size of the book only intimidates a non-habitual reader into never opening it (or as little as possible)!
- Safety & skills were repeated redundantly year on year - it was tacitly acknowledged that it would be impossible for students to carry around the earlier year books too…

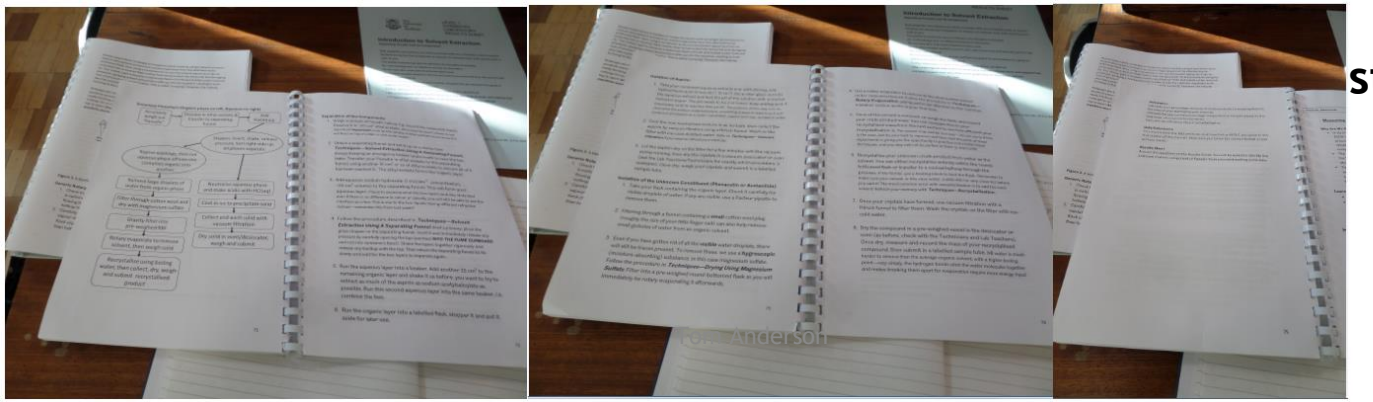
The old manual compared to the two new split ones



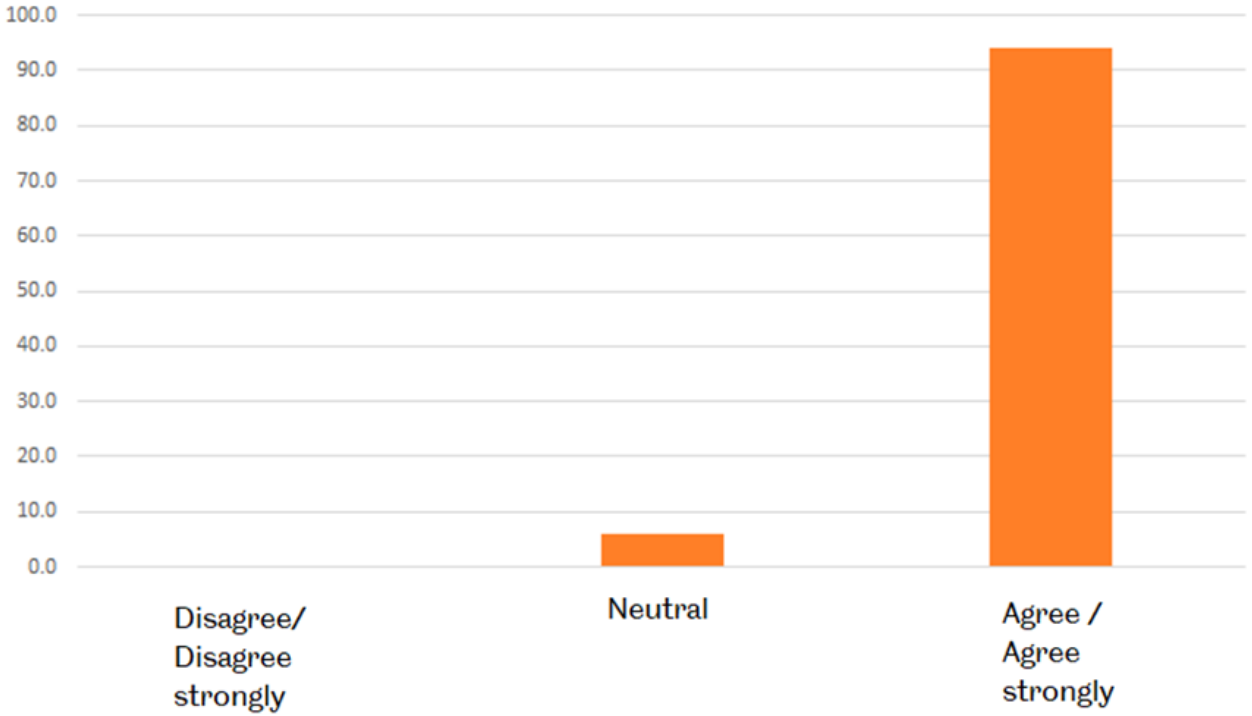
A 9-page experiment in the old lab manual…



…becomes 5 pages in the new lab manual, but still with all the extra explanation needed for a student doing something for the first time.



Student feedback...



Splitting the general safety and techniques used for any experiment into a separate manual, to be carried forward to future years, is better than having one big manual for everything with repeated information each year

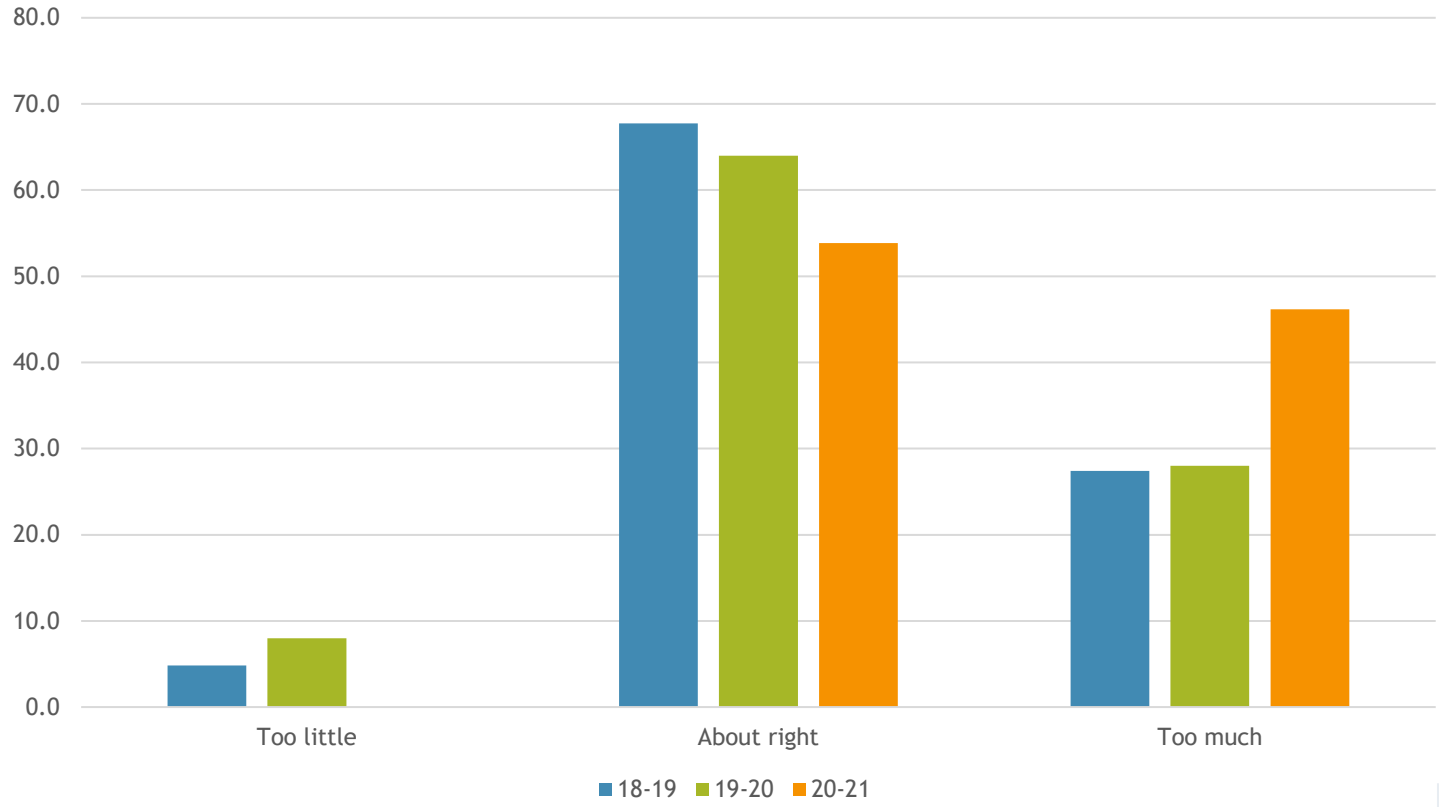
Focus Group:

"I think in labs they did pretty well with giving us … a safety manual and a lab guide with everything that we might need to know in terms of equipment."

NB students do not have a basis for comparison for this…

One problem with lack of context!

“The amount of time spent on assessment (e.g. how long I spent on my write-ups) in the lab course I have done so far this year is:”



	Too little	About right	Too much	Responses
18-19	*4.8*	*67.7*	*27.4*	N=63, 97%
19-20	*8.0*	*64.0*	*28.0*	N=50, 100%
20-21	*0.0*	*53.8*	*46.2*	N=50, 71%

…when write-ups were cut by 40% from 18-19 to 19-20, and then cut further from 19-20 to 20-21!
But there are other factors involved…

Another example of teacher-student disconnect…

"…the most useful designation I have found for them is ***Digital Natives***. Our students today are all "native speakers" of the digital language of computers, video games and the internet."

-Marc Prensky, 2001 [1]

"I could use more help with this [assignment] … I've never really used a computer before"

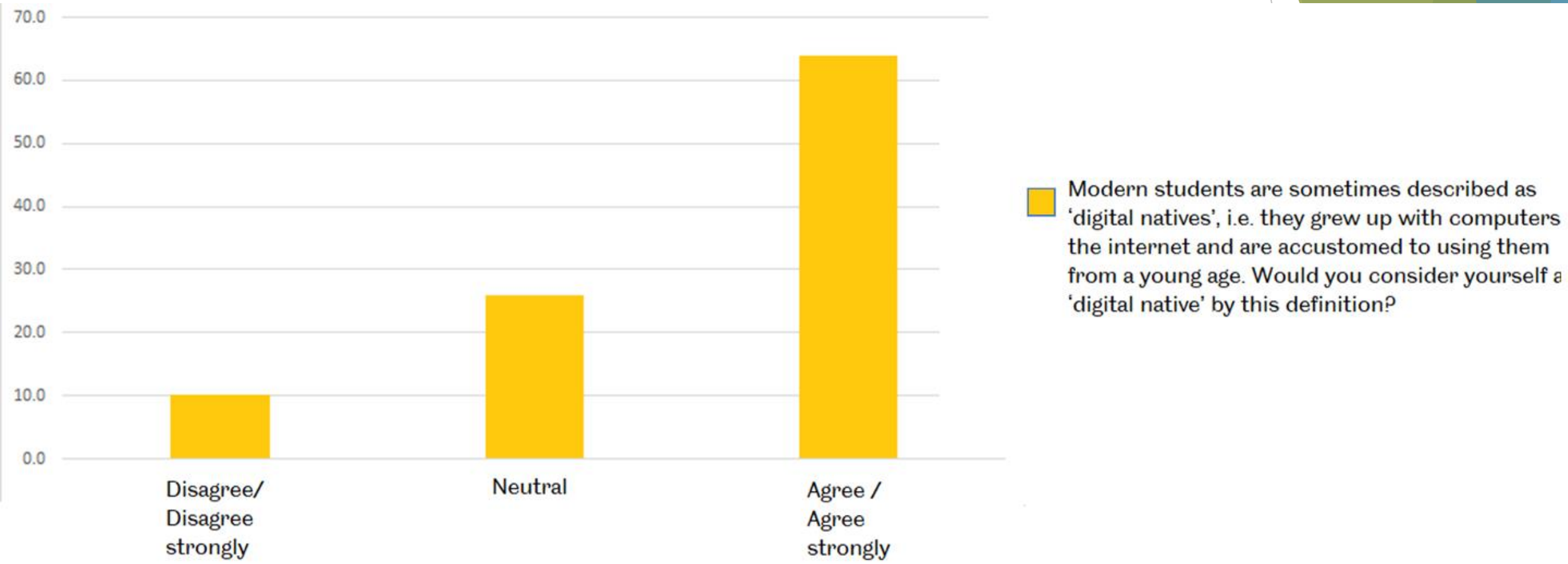
-A current first-year UK home student from an average economic background, born in 2002 [2]

This became very relevant in 2020!

[1] Prensky, M. "Digital Natives, Digital Immigrants", *On the Horizon*, MCB University Press, 2001, 9(5) 1-6

[2] Verbal comment to myself, reproduced with permission.

The importance of avoiding stereotypes!



2020-21 Survey by T. Anderson. N=50 (71% response rate), using an anonymised paper survey approved by the University of Sheffield's ethics approval process. Further details available on request.

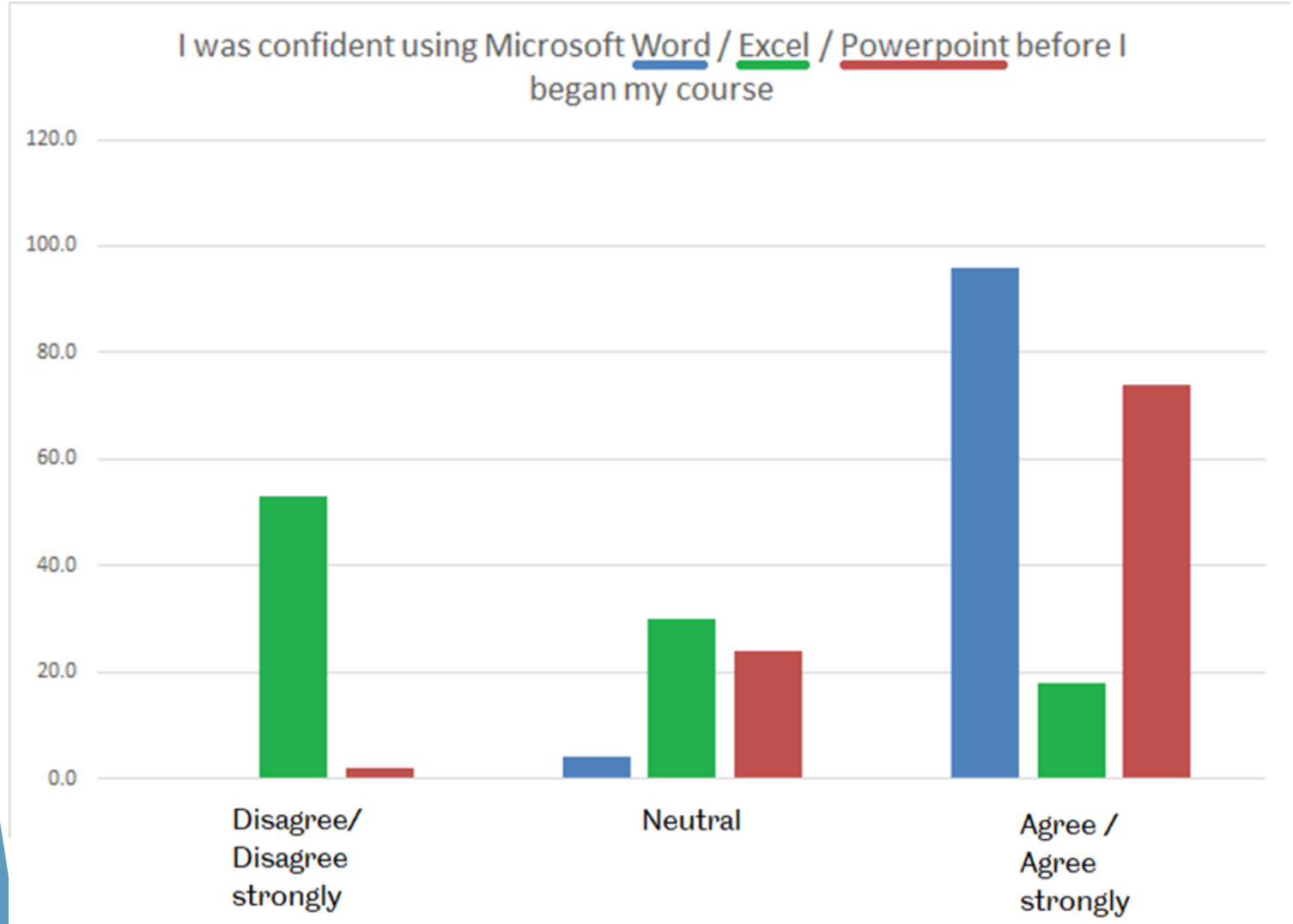
Student focus group feedback

“Yeah, probably, yeah, I'd probably describe myself as a digital native, but it's definitely a spectrum because, like, I'm pretty sure that almost everyone our age can open a Web browser and look at YouTube and so on, like half can work [E]xcel and then like, fewer could do coding. So like it's definitely a spectrum. Like it's not just something you are or you aren’t.”

“…at GCSE level, we did a lot. We sort of like [W]ord and PowerPoint, even if they do IT skills and stuff like that. But realistically, never had to use Excel. Never. So for me, I just walked in having no idea how to use Excel. I think that was quite daunting, having no idea how to use it.”

“I was fairly confident in using Excel beforehand, and I think I would agree that people's experiences vary massively depending on where they went 6th-form and also what course they do, because I know that a massive factor for me was that because I did physics for A-level, a couple of those practicals use Excel, which just really help me with my graphing skills in Excel for when it came to uni.”

The importance of avoiding stereotypes!



Significant for how Physical Chemistry labs are introduced & presentation skills development

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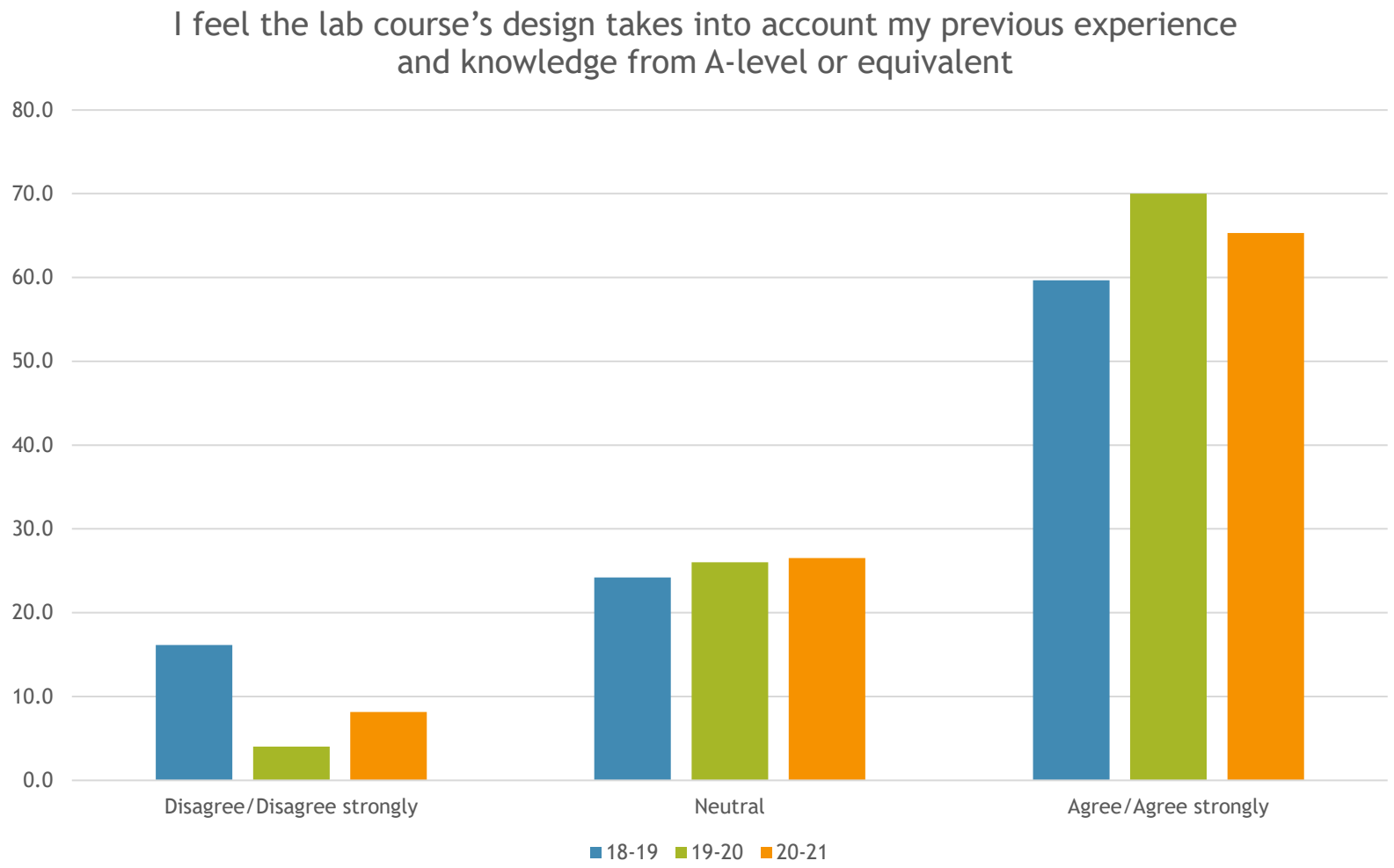
Student feedback…



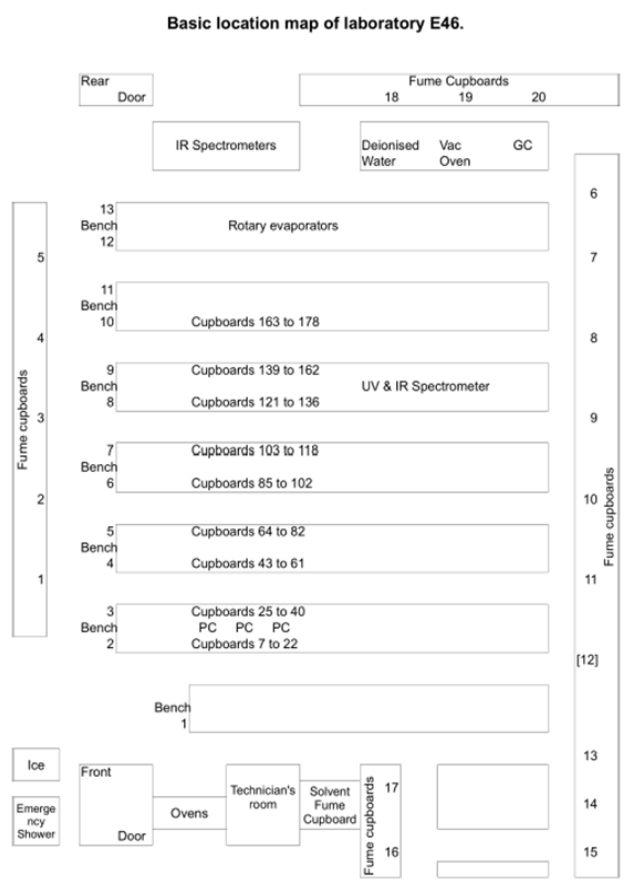
	Responses
18-19	N=63, 97%
19-20	N=50, 100%
20-21	N=50, 71%

Surveys by T. Anderson (see year and participation at right), using an anonymised paper survey approved by the University of Sheffield's ethics approval process. Further details available on request.

Pandemic response!

- We have access to large, spacious teaching labs that make social distanced teaching possible. Full risk assessments showed a lab usually capable of holding 55 students could accommodate 18 safely: 4-day lab week system implemented.

(An old pre-pandemic photo for illustration only!)



Pandemic response!

- Social distancing means that work previously carried out in pairs, or closely supervised by postgrads, now has to be done more independently.
- The new A-levels and my innovations in this direction thus paved the way for pandemic teaching!

MON	TUE	WED	THU	FRI	SAT	SUN
Week before lab: do pre-lab assignments (PLAs), make notes				*PLA deadline 3pm!*		
Lab Day 1	Lab Day 2	*(no lab)*	Lab Day 3	Lab Day 4		
Submit data	*and write*	*up Results*	*Booklet, submit online*			
Booklet & data submission deadline 9am!	*(Markers marking your work) You will be emailed your marked work before the next lab week.*					

Focus Group Feedback

“[P]ersonally, I love the amount of freedom that we had, so there wasn't anything like just looking over and kind of micromanaging every move. So I love having … that much level of control, like choosing what we do and what order we do it in. And that kind of freedom. So that was amazing.”

“I really like the independence. … the independence is really daunting to begin with because it's a completely new situation. … But like, once you get over that, like, hurdle, like the independence, I think [it] is really, really good.”

Other pandemic response work

- Online marking and feedback – moderation as markers acting alone
- Training videos for students, colleagues and postgraduates (only one per lab – could not rely on more experienced colleagues)
- Management of student expectations
- 4-day lab week meant the conversion of some experiments to exercises with short online submissions rather than full write-ups

Conclusions

- We must respond to changes in A-levels – but this problem is also an opportunity to challenge our students.

- My self-led learning innovations stood us in good stead when students had to work more independently during the pandemic

- The student experience cannot be reduced to stereotypes. Close consultation with and survey of the student population not only informed my reforms to manage the transition from the altered A-level course; it was also a vital tool in building a Covid-safe lab course. This illustrates the importance of pedagogic research-led teaching in the modern university.

Thank you for listening