



Use of OSPE's to assess science student practical skills and graduate attributes

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2. Background

- Need for a rigorous final year practical experience
- Assess students from a wide variety of different backgrounds
- Assess skills that are not the usual focus of our teaching and learning activities
- Curriculum Reform and demonstration of Graduate Attributes and Employability skills (citizenship, time management, ethics, people skills etc?)
- Staff succession planning – ‘business continuity’
- Preparation for Honours projects/job interviews/employment
- The majority of our science students are no longer ending up in research.
- Involvement of students in improving what we do

3. For Minister, maybe read Head of School/Dept?

- Sir Humphrey: There are four words you have to work into a proposal if you want a Minister to accept it.
- Sir Frank: Quick, simple, popular, cheap. And equally there are four words to be included in a proposal if you want it thrown out.
- Sir Humphrey: Complicated, lengthy, expensive, controversial. And if you want to be really sure that the Minister doesn't accept it you must say the decision is courageous.

From the Yes episode "The Right to Know"
Image from http://news.bbc.co.uk/1/hi/uk_politics/6494601.stm



4. Introduction of the Objective Structured Practical Examination (OSPE)

- I had been an external examiner at a medical school and had to assess standards for their OSCE's.
- Much of what they were doing was common to science disciplines.
- They were assessing huge numbers of students rigorously and efficiently.
- Why can't we do that?

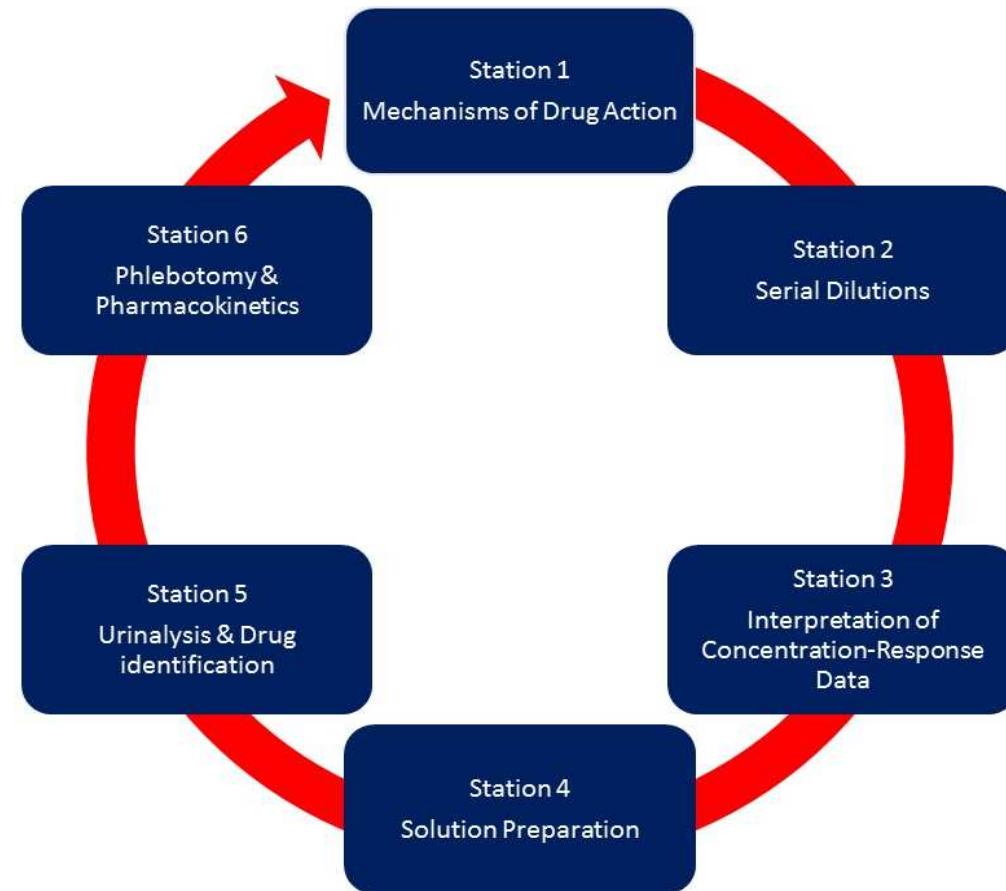


5. What is an OSPE?

- Used commonly in clinically-related education for a long time
- Multi-station assessments where students rotate round the stations to perform tasks
- Avoids need for lengthy written pieces of work
- Can design stations to suit tasks, skills or types of students you want or need to assess
- We introduced them gradually and were overwhelmed by positive comments in course feedback from students and staff, and wider demand from students who wanted their discipline to adopt them
- ‘I want to show I’m good at things other than writing essays, lab reports and doing MCQ’s’

6. Objective Structured Practical Examination (OSPE)

- An assessment of theoretical, practical and problem solving skills.
- Degree specific assessments for physiology, anatomy, sport science and pharmacology.
- Assesses and develops transferable skills.
- Benefits visual or kinaesthetic learners.
- Full day practice 1 week prior to the 1 hr assessment.



OSPE Assessment stations/lab layout used for pharmacology students.

7. Do we already use OSPE's in science disciplines?



- Yes, sometimes.
- Common in anatomy e.g. a 'spotter' exam.
- Sometimes we use multiple stations in practical classes when space/equipment is limited.
- But often very limited in terms of scope, skills assessed and research associated with science OSPE's.

8. Design, staffing, logistics etc

- Plan well and get multiple staff to look over plans
- Number of stations, time, learning outcomes, skills?
- Check with technical staff – they will convert your mad ideas into reality
- Assume disasters will strike and have backup plans in place
- How will you help students prepare, navigate stations, time stations, assess tasks etc?
- What if students miss their time, classes get larger, students have disabilities etc.
- What about intercalating/exchange students?
- What about the external examiners?



9. Physiology
academics &
technicians
assemble!

Outline Protocol

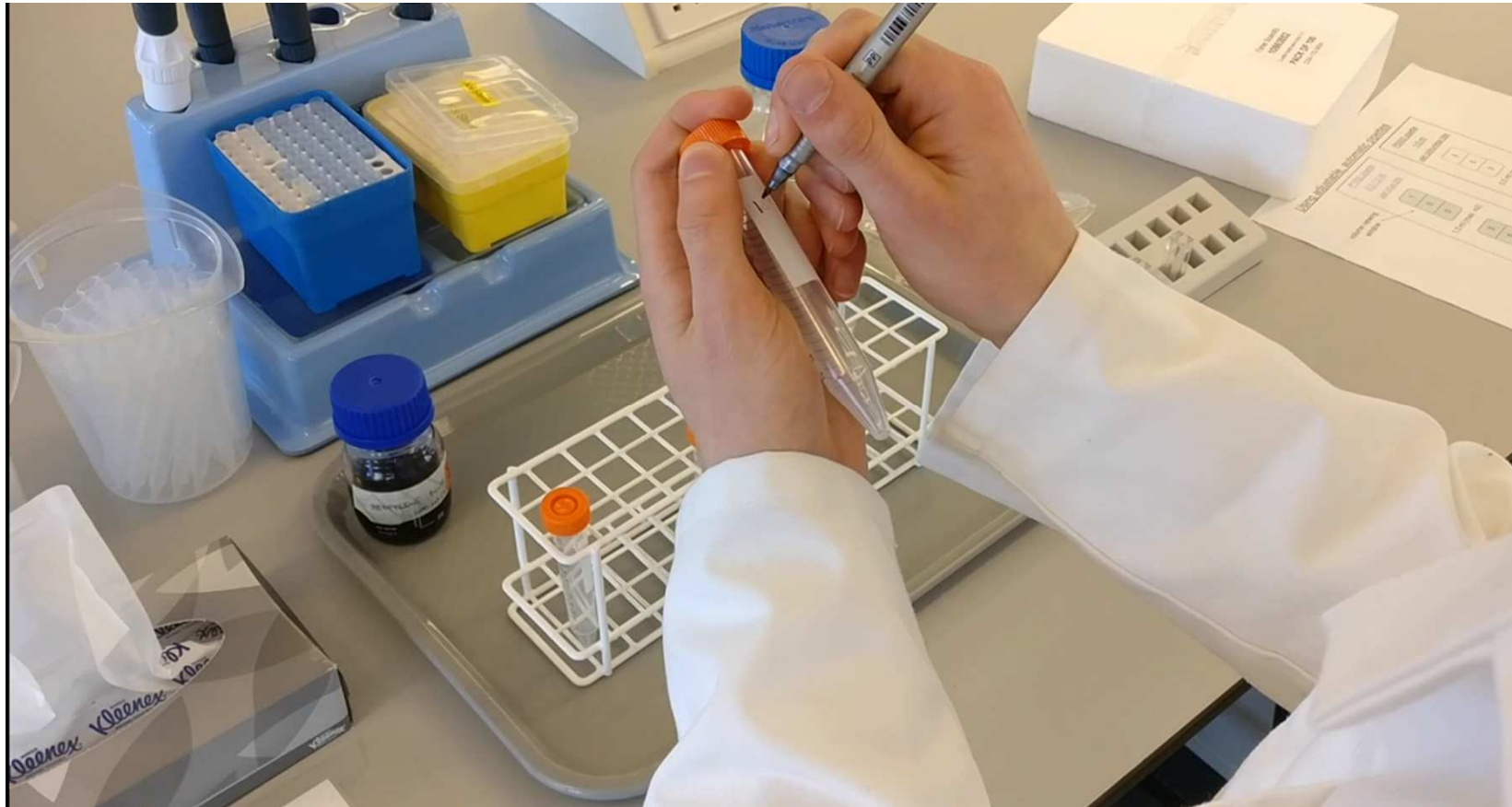
- 100 students over 2 assessment days
- Assessment tasks introduced during an all day practical class

- VLE resources/extra tuition provided
- Students move round each station for assessment

- Objective and consistent
- Stations reusable and adaptable



11. Used very basic equipment for most stations

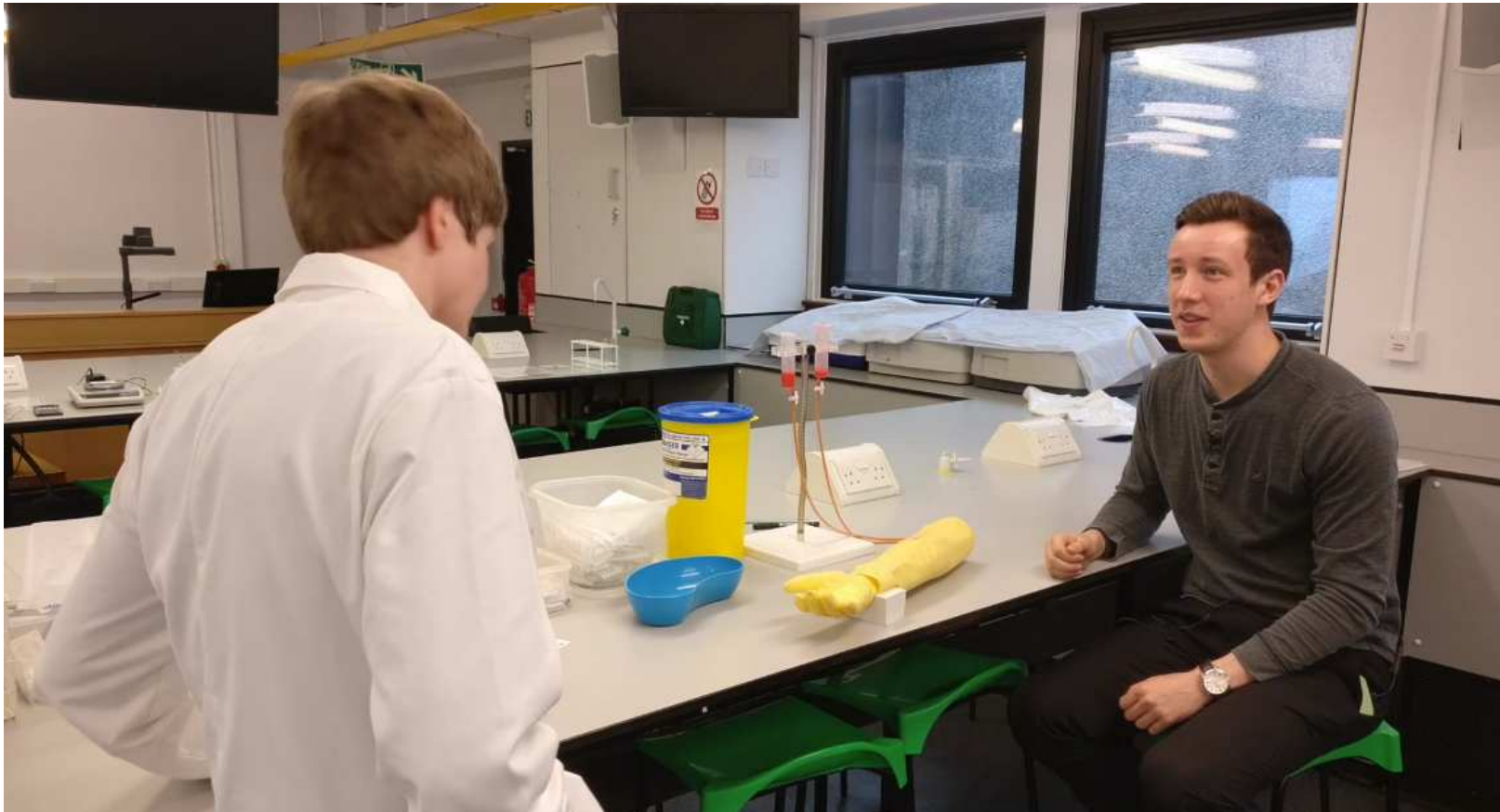


12. Communication Skills (10 mins)



- This station has an actual staff examiner who roleplays.
- Phlebotomy – a new practical skill for majority of students but this station is NOT really about phlebotomy.
- Students interact with examiner assuming they are a research study volunteer.
- Enables assessment of ethical approach, communication skills, H&S, using sharps– ALL whilst undertaking a new task (taking a blood sample) .
- Marking scheme (positive and negative marking) published in advance.
- Moved from paper marking system to iPad after 1st year to enhance feedback.
- Continual review of marking scheme each year to improve consistency between examiners.

13. Again, really basic set-up but professional standards are enforced



14. Results

- Despite some stations being stereotypically perceived to be harder for the students (e.g. phlebotomy), it turned out that they did very well at those, and it was the more fundamental practical lab skills (e.g. serial dilution) that seemed to stress students more.
- Average grade over last 5 cohorts (n = 253 students) = $76.2 \pm 0.7 \%$.

Feedback from anonymised central university survey 2016-17

How effectively did the OSPE exercise address your learning needs? (n = 53)

The OSPE practical sessions

BM4009 STAYING ALIVE - ADAPT



15. Developing over first five years

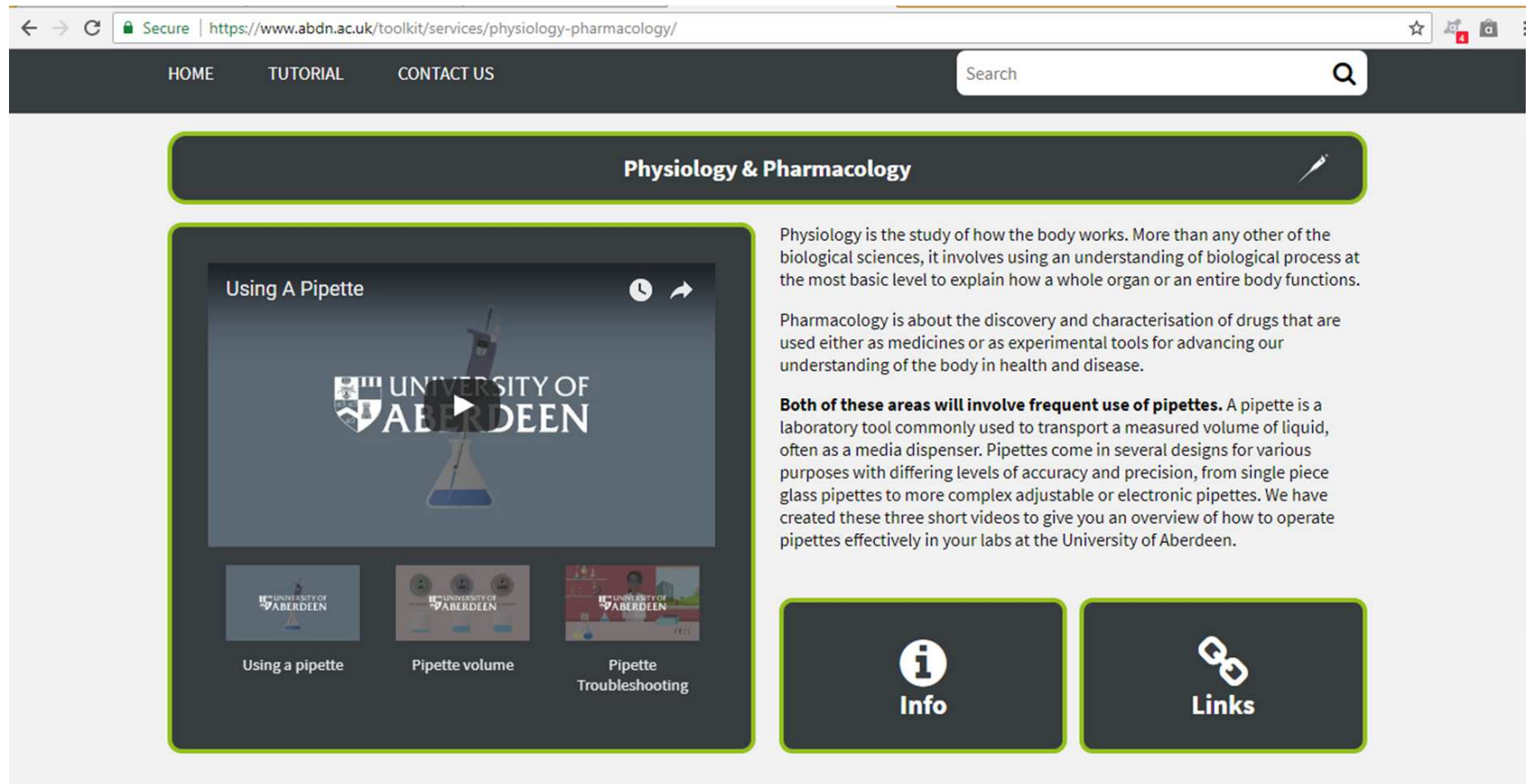
- Had to run duplicates of stations (had them anyway in case of problems during assessment, but could now assess 12 students at a time, rather than 6.
- Tried running OSPE in larger labs in other campus and they transferred well as everything was portable or already in other campus.
- Dealt with power failures, spillages, broken legs, IT issues and coped!

16. Now what?

- More classes (e.g. anatomy, sport science) wanted to get involved but could we cope?
- Can we improve?
- More staff volunteered to get involved.
- Student ratings increased markedly.
- Can we make it more flexible?



17. Toolkit – development of science resources



The screenshot shows a web browser window with the URL <https://www.abdn.ac.uk/toolkit/services/physiology-pharmacology/>. The page has a dark navigation bar with 'HOME', 'TUTORIAL', and 'CONTACT US' links, and a search bar. The main content area is titled 'Physiology & Pharmacology' and features a large video player for 'Using A Pipette' with a play button and the University of Aberdeen logo. Below the video are three smaller video thumbnails: 'Using a pipette', 'Pipette volume', and 'Pipette Troubleshooting'. To the right of the video player, there are two paragraphs of text and two buttons labeled 'Info' and 'Links'.

HOME TUTORIAL CONTACT US Search

Physiology & Pharmacology

Using A Pipette

UNIVERSITY OF ABERDEEN

Using a pipette Pipette volume Pipette Troubleshooting

Physiology is the study of how the body works. More than any other of the biological sciences, it involves using an understanding of biological process at the most basic level to explain how a whole organ or an entire body functions.

Pharmacology is about the discovery and characterisation of drugs that are used either as medicines or as experimental tools for advancing our understanding of the body in health and disease.

Both of these areas will involve frequent use of pipettes. A pipette is a laboratory tool commonly used to transport a measured volume of liquid, often as a media dispenser. Pipettes come in several designs for various purposes with differing levels of accuracy and precision, from single piece glass pipettes to more complex adjustable or electronic pipettes. We have created these three short videos to give you an overview of how to operate pipettes effectively in your labs at the University of Aberdeen.

Info Links

18. Did the Science Toolkit resources get used?



- In the past year alone (2018-2019), the Scientists' Toolkit was accessed by >816 users
- Had >1000 views
- >30% of views outwith the University (including international).
- These videos were authored by students for their peers.

19. So far so good....



20. How do we deal with more students without spending hours practicing beforehand?



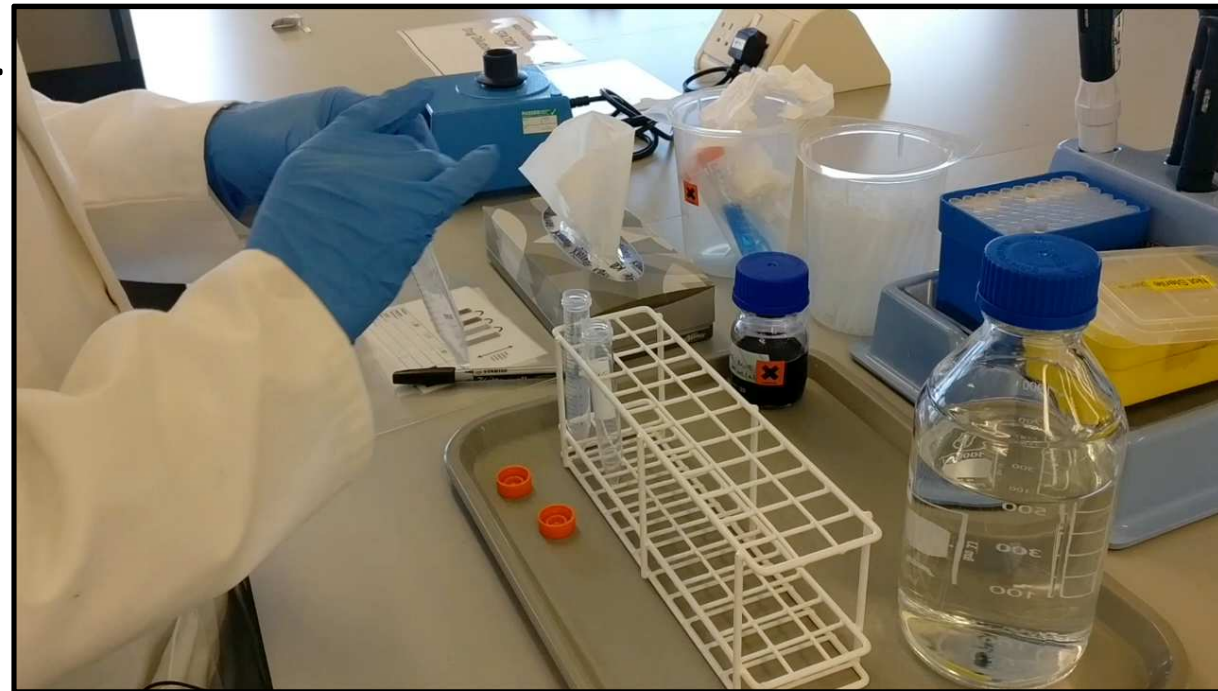
21. Student-led production of videos to demonstrate what is expected at each station



- Suggested by students in feedback, particularly those students with caring responsibilities, disabilities, or those who commuted.
- Allowed students to be more flexible in their timetables/study.
- Staff didn't have to spend a couple of days undertaking practice sessions – now only 2 hours scheduled practice time, but students could optionally sign up for more if they wanted it.
- BUT, they would have instructional videos to go along with each OSPE station that they could access whenever they liked and as often as they liked.

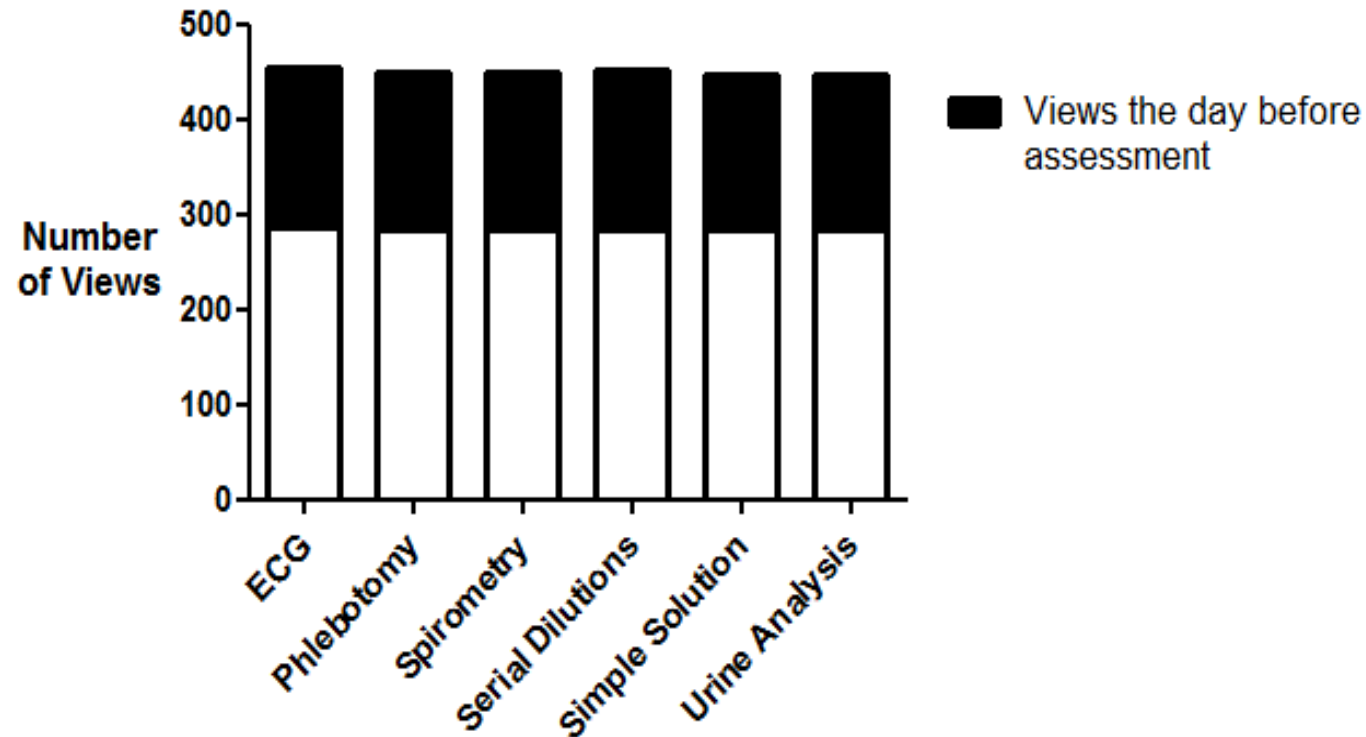
22. Video Learning Resources

- Could demonstrational videos make up for a reduction in practice time?
- Video development was student-led.
- “How to...” style videos demonstrating each station.
- Created using smartphones and free video editing software.
- Videos made available on the University virtual learning environment.



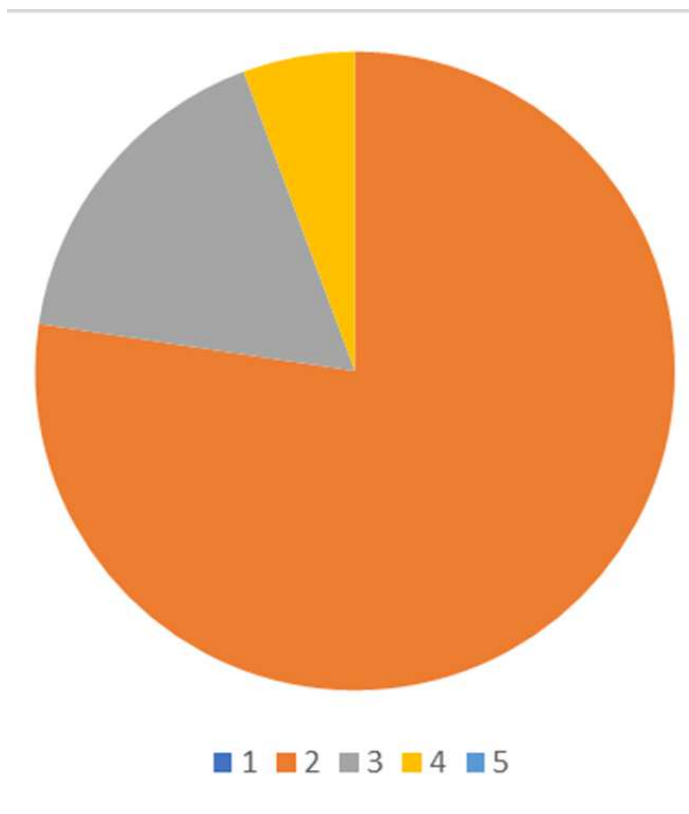
23. Student Use of Video Resources

- Virtual learning environment monitored access to videos.
- Each video was watched an average of 6.4 (± 0.03) times per student.
- Surge in video usage the day before the assessment.



2018-19 Physiology & Anatomy students (70 students) total video usage and usage on day prior to assessment.

24. How confident were you BEFORE the OSPE about your ability to complete the stations properly?



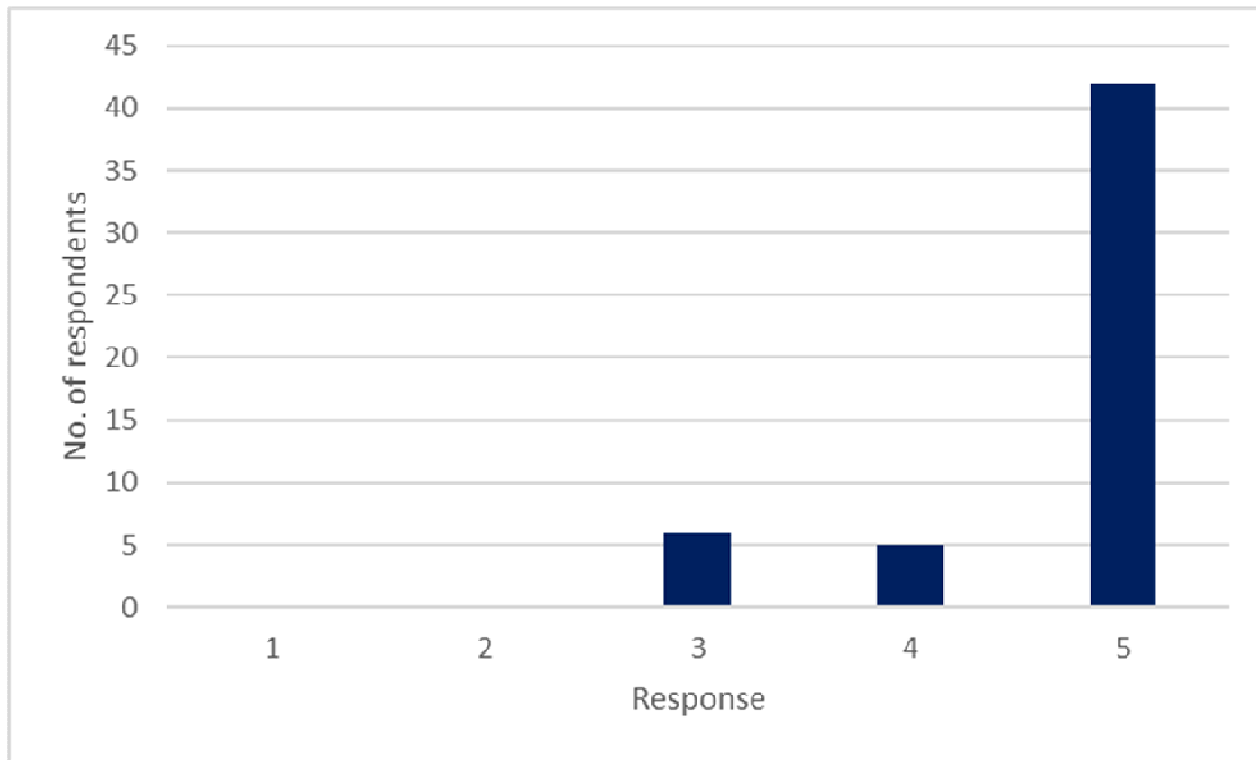
1 – not confident at all
5 – extremely confident

N=53

25. Did you prefer the OSPE to a 'traditional' practical? N = 53



26. How much did you use the videos to prepare for the OSPE?



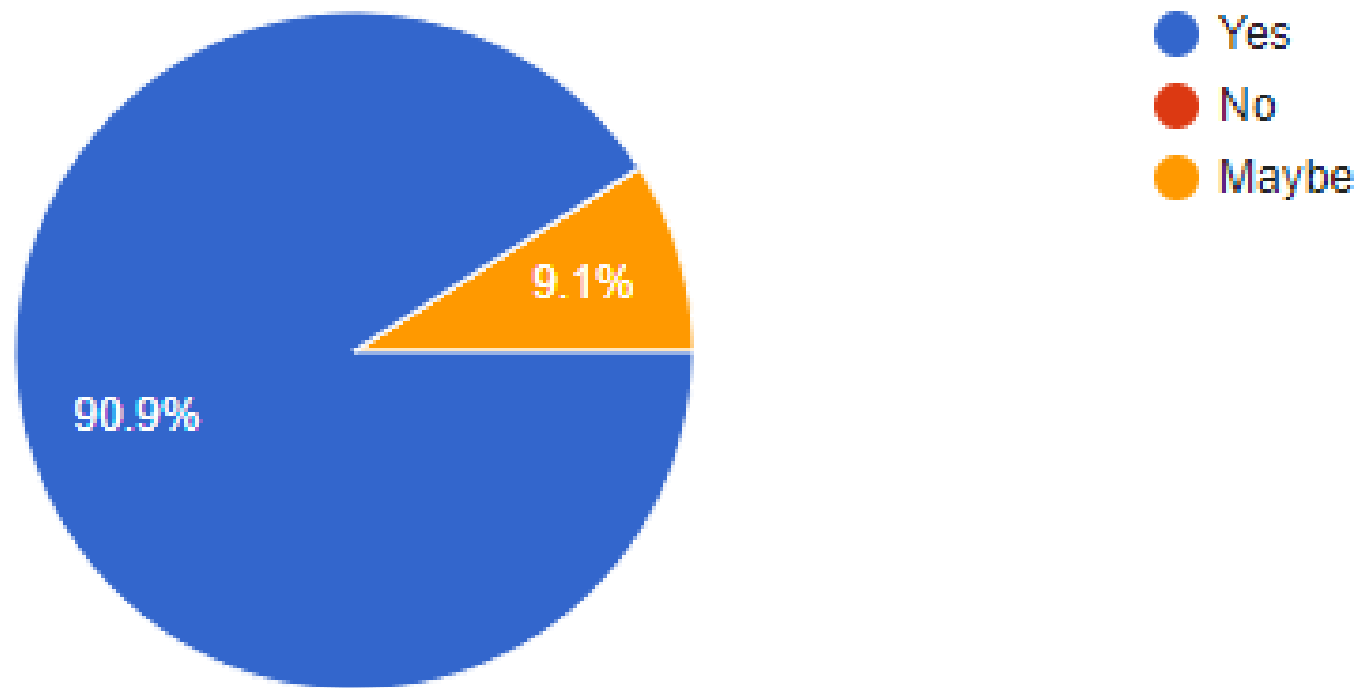
1 = not at all
5 = a huge amount

N = 53

27. How effective did you think each video was in terms of helping you learn what was expected at each station?



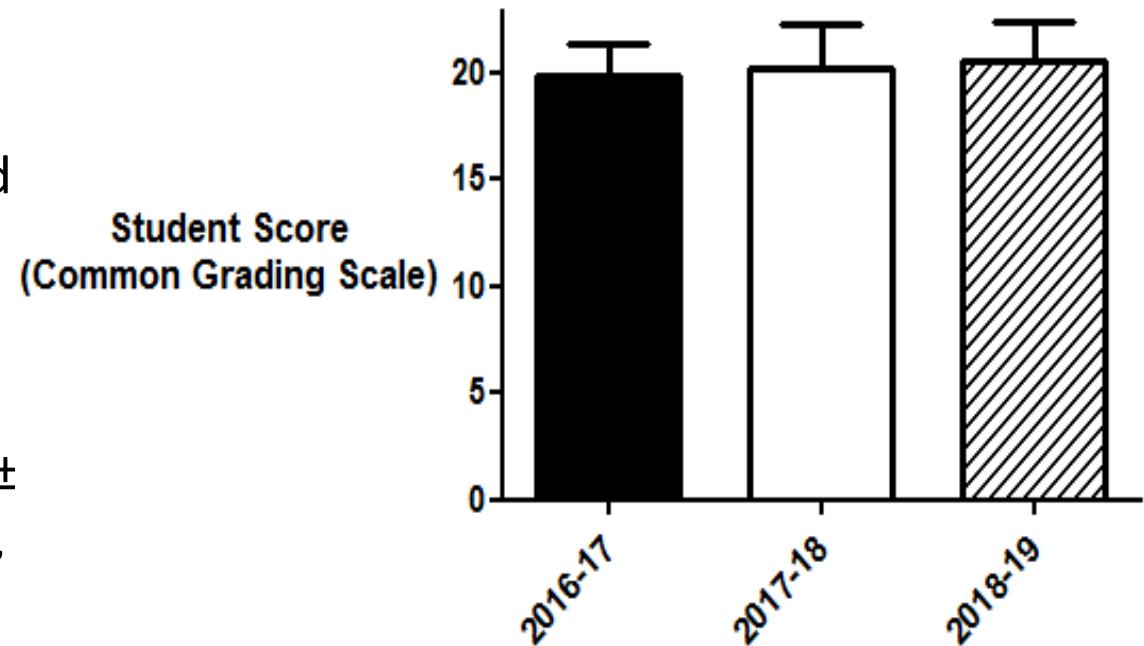
28. Did the OSPE make you think about skills other than practical scientific ones that employers/ project supervisors might expect you to possess?



N = 53

29. How did the videos affect student grades?

- No reduction in mean grade despite reduction in practice time for 2017-18 and 2018-19 cohorts.
- Small but significant improvement in outcomes between 2016-17 cohort (19.8 ± 1.5 , $n=67$) and 2018-19 cohort (20.5 ± 1.9 , $n=70$) ($P<0.05$).



Mean (\pm stdev) grades in OSPE assessment of 2016-17 ($n=67$), 2017-18 ($n=71$) and 2018-19 ($n=70$) physiology and anatomy student cohorts. Common grading scale: 0 – 22.

Student performance did not suffer from reduced practice time, potentially due to availability of video resources.

30. Outcomes & Feedback



Students

- Found the process “a bit stressful” but worthwhile preparation for upcoming practical work and employment opportunities.
- Reported thinking more about skills expected in future employment, and also considering their strengths and weaknesses.
- Appreciated videos, but can always improve

Staff

- A useful way of assessing wide array of graduate attributes at Honours level WITHOUT large amounts of paperwork.
- However, requires planning, clear aims and flexibility in initial stages.
- Assessment of communications skills improved.
- Reduced staff workload without apparently causing any detrimental effects to student experience and performance.

31. Comments about videos

- Some small errors
- Large file size, takes time to buffer – maybe use YouTube so we can access via phones?
- Liked that none of them long – usually 3-5 minutes
- Liked that it was students designing and presenting them – at correct level
- Should make more for all sorts of skills types during our curricula
- Staff felt they spent less time explaining how to do things but more time discussing why things mattered and reflecting with students about their approaches

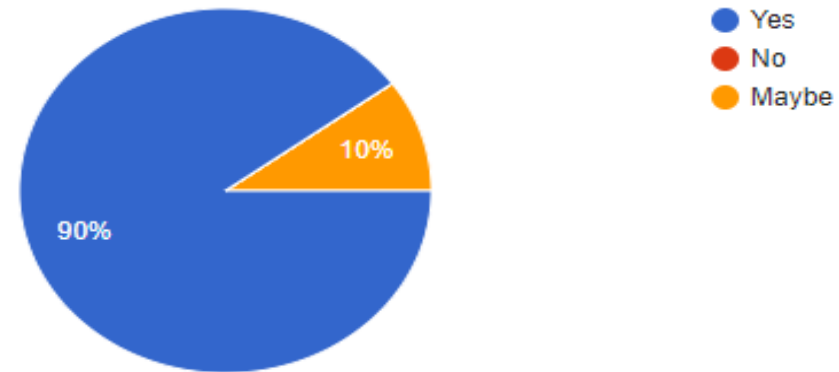
32. Enhancements – so far

- Remove paper and automate (iPad marking)
- Increase the number of staff (engagement) and disciplines.
- Completely remove subjectivity in assessment?
- Increased student numbers
- Emergency back up plans (business continuity)
- Duplicate stations and multiple locations used
- Videos of stations on VLE to help practice and preparation
- Integrate use of technology
- Encourage greater student reflection on skills weaknesses (time management, communication etc)
- Different stations

34. Pharmacology OSPE Feedback

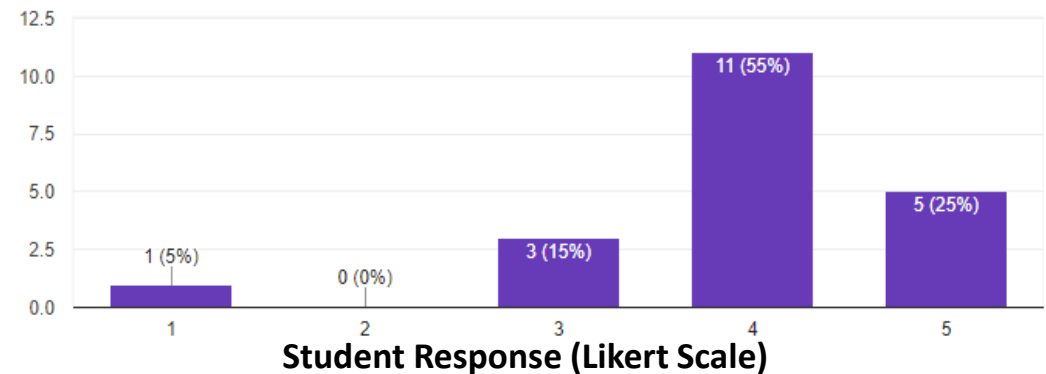


- Anonymous feedback received via the University central course evaluation forms.
- Positive feedback received from both staff and students.
- The OSPE assessment and videos cited as one of the best things about respective courses.



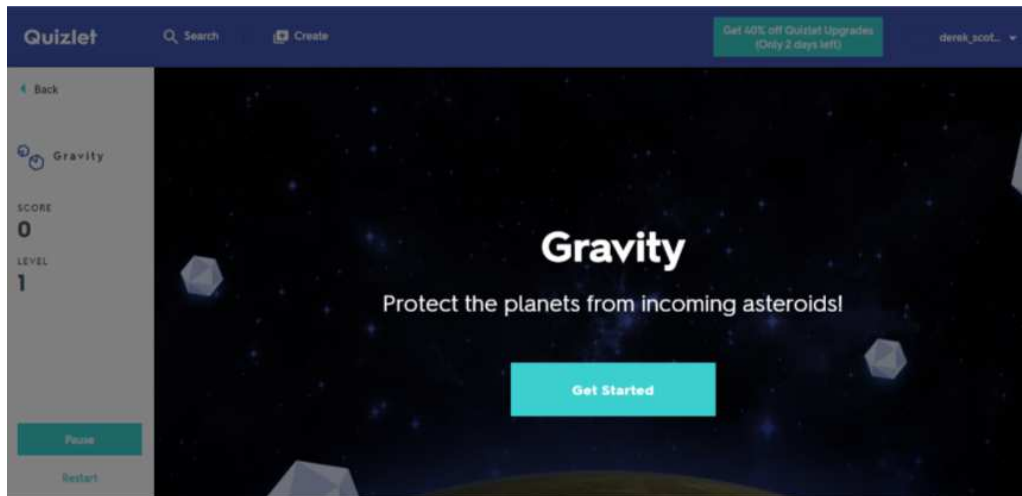
Did you prefer the OSPE to a 'traditional practical'? n=20

Number of Student Responses

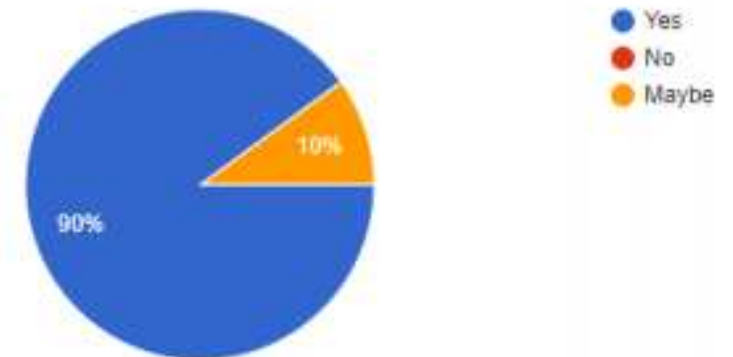
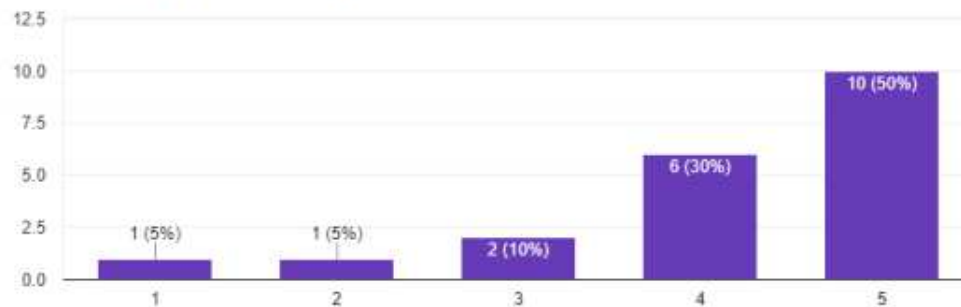


Did you find the science aspects or the non-technical aspects of the stations (i.e. time management, organisation, communication skills etc) harder? 1 = science skills, 5 = non-technical skills, n=20

35. Student-Led Gamification - Quizlet



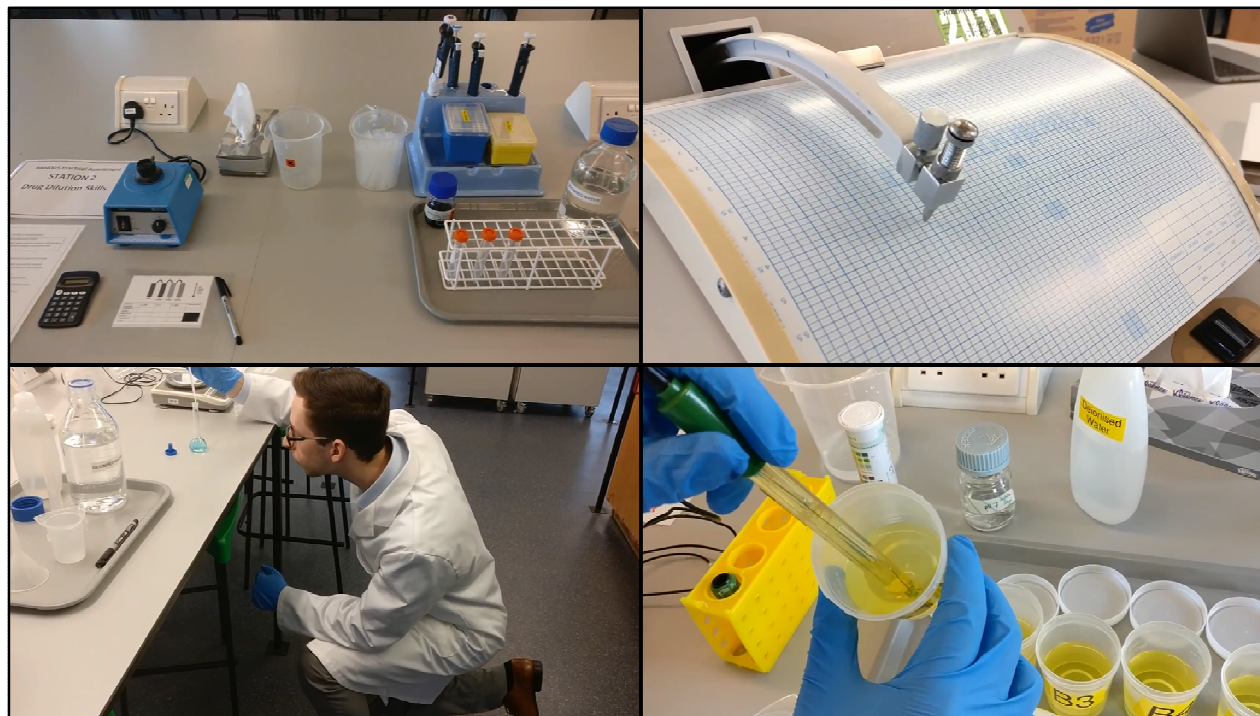
How much did you use the Quizlet app to practice for the station where you had to match drugs, with targets and mechanisms? 1 = not at all, 5 = a huge amount



Do you think that apps like Quizlet that try to 'gamify' revision are useful?

36. Future Work

- Developing more videos to demonstrate a wider array of practical skills.
- Adapting the OSPE for other degrees, e.g. Neuroscience, Molecular Sciences.
- Interest from Chemistry, Philosophy etc.
- Develop games for students to practise more theoretical stations.
- Adapting video demonstrations to other traditional practicals within the curriculum.



37. Adapting it to fit into the new Central Science Teaching Hub with three other science schools....

- Paperless labs
- No desktop computers.
- Complete review of why, how, when we do practical classes.
- How can we make classes more flexible, speed up feedback and improve the student (and staff experience)?



38. Summary

- It is a total team effort.
- Work with students as partners – we built it, they improved it.
- The students are sometimes nervous, but they try so hard, and usually do really well.
- Assesses huge number of skills, adaptable, flexible and can tell you more about many graduate attributes than a standard lab practical can.
- Students report that it gives them evidence for job applications/interviews and highlights for them how they should enhance.
- Staff like it because they can get involved, spend more time teaching, and can adapt it to suit the student cohort they are working with.
- Don't be afraid to try that mad idea you have – it may work!

39. Acknowledgements

- Jack Kirkman
- Cameron Malcolm
- Profs Alison Jenkinson & Graeme Nixon
- Drs Fiona Murray & James Hislop
- Mrs Alison Davidson, Elaine Lyall & all the teaching technicians who have been involved.
- The many staff and PhD student demonstrators who have also contributed over the years.

