Developing and evaluating a virtual laboratory to support medical student oncology education
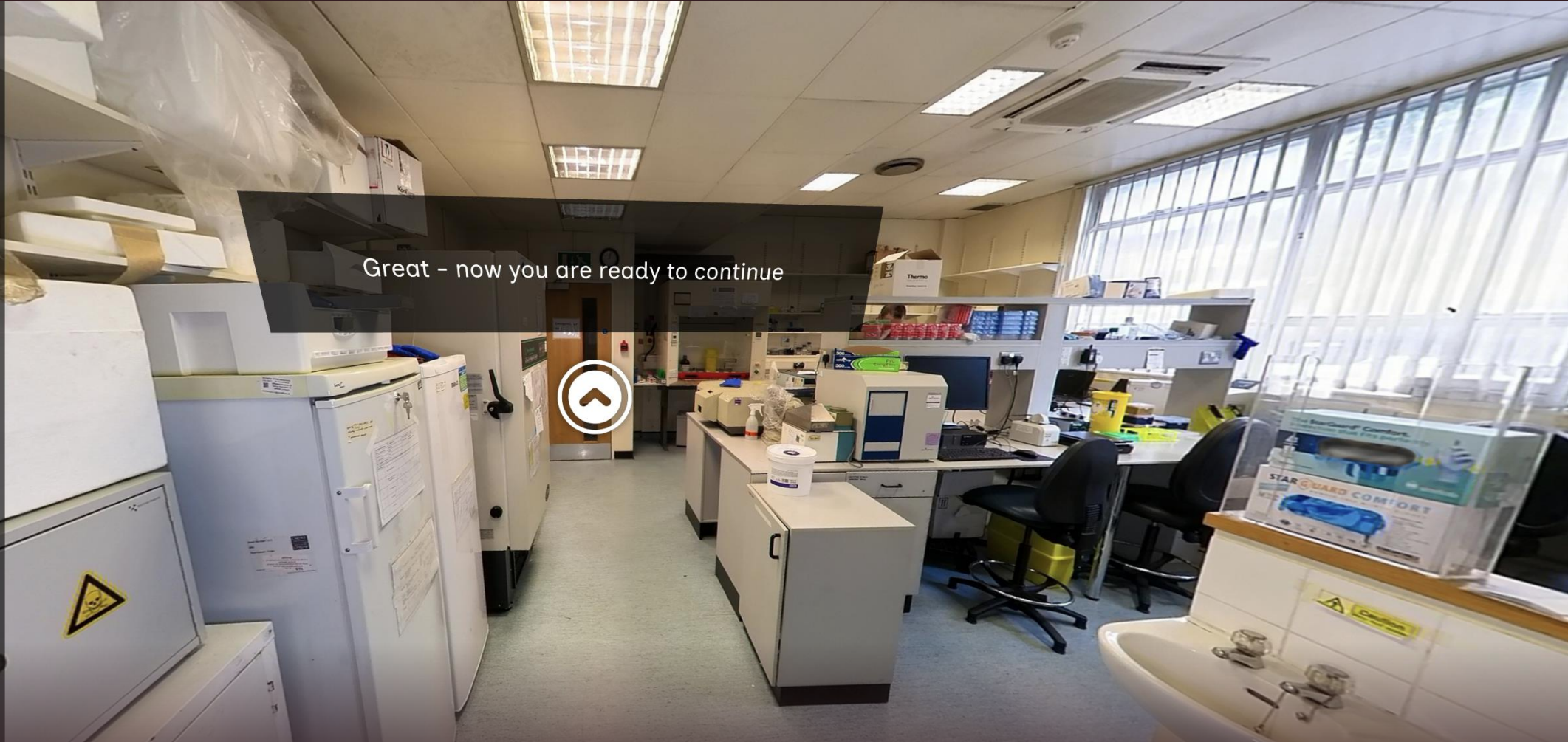
Karen R Reed

Owen J Crawford

Safety Information
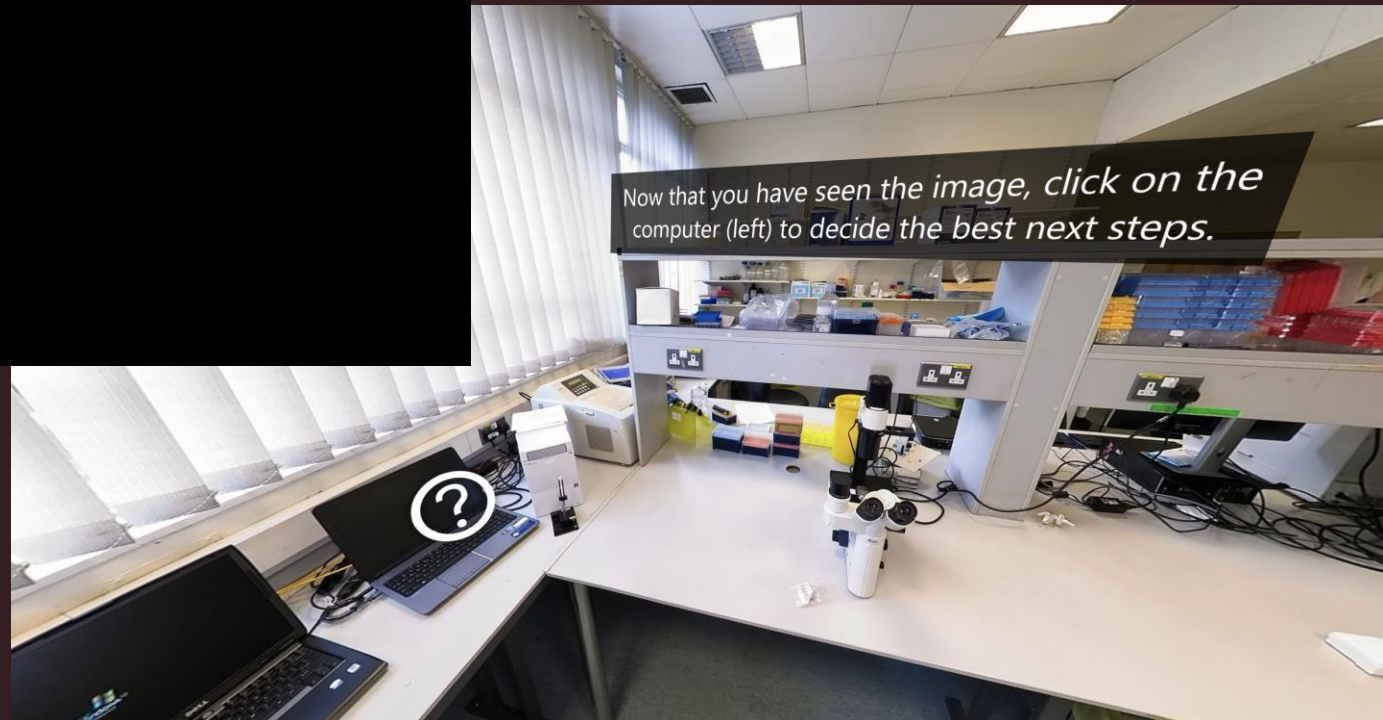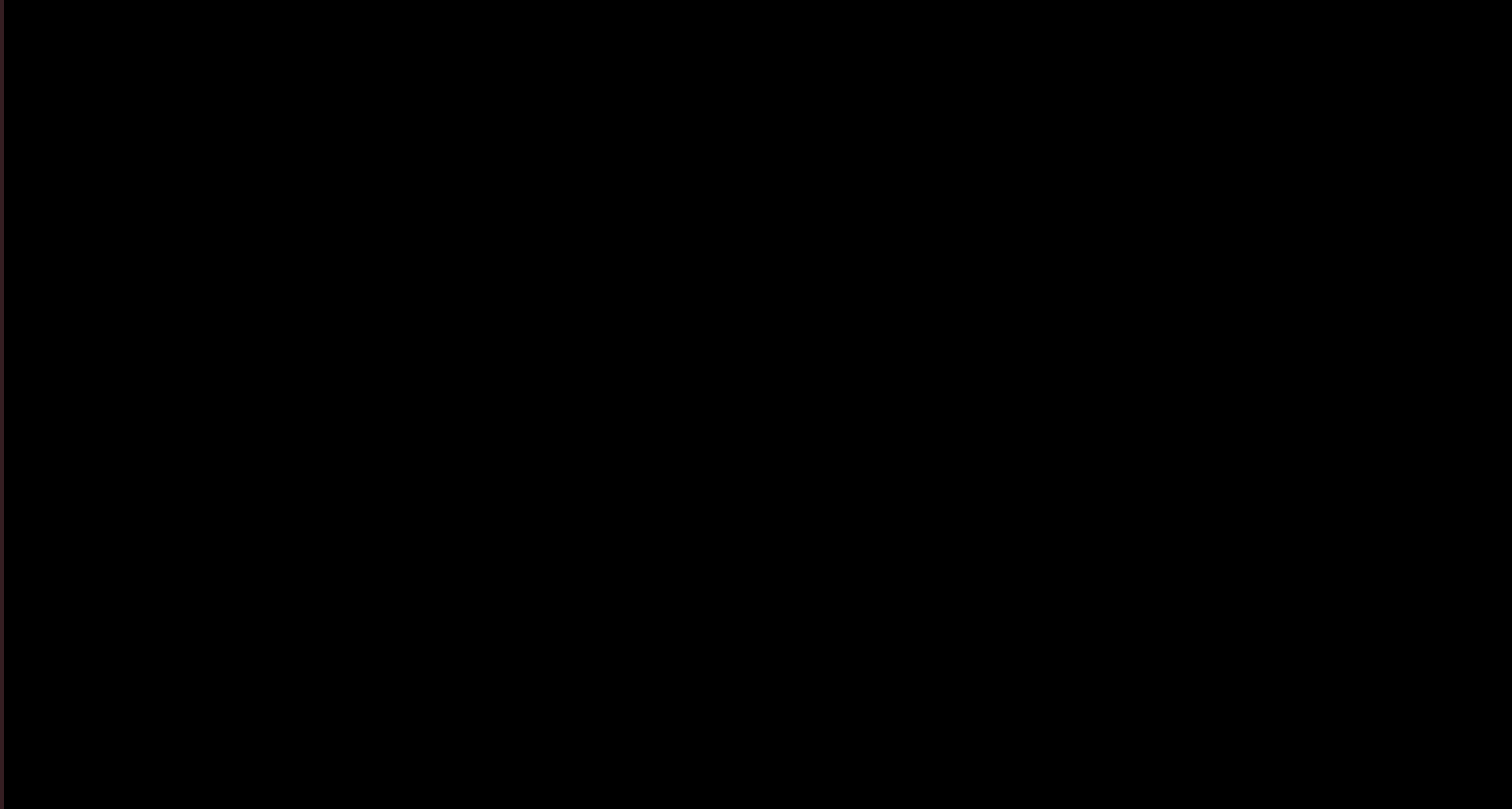
Lab Coat

Gloves

Great – now you are ready to continue

The VR-lab

Now that you have *seen the image, click on the* computer (left) to *decide the best next steps.*

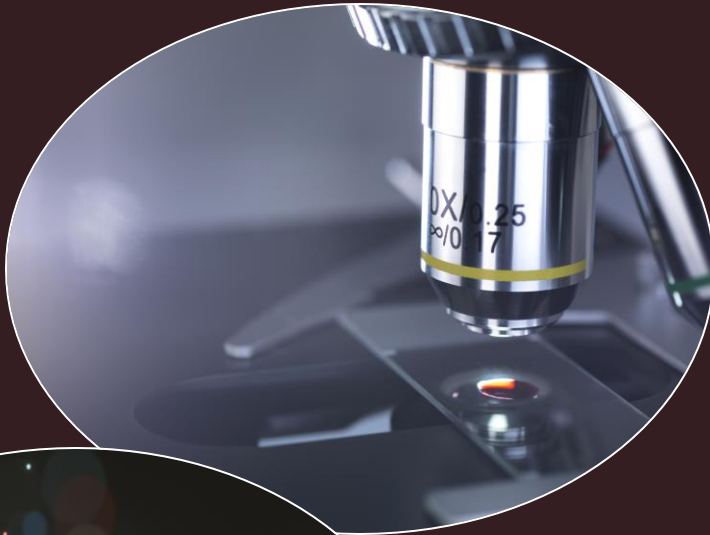| Name	Role	Organisation	Email
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The Team

Thank you to Prof Rachel Errington and Prof Aled Clayton for agreeing for us to photograph their laboratory.
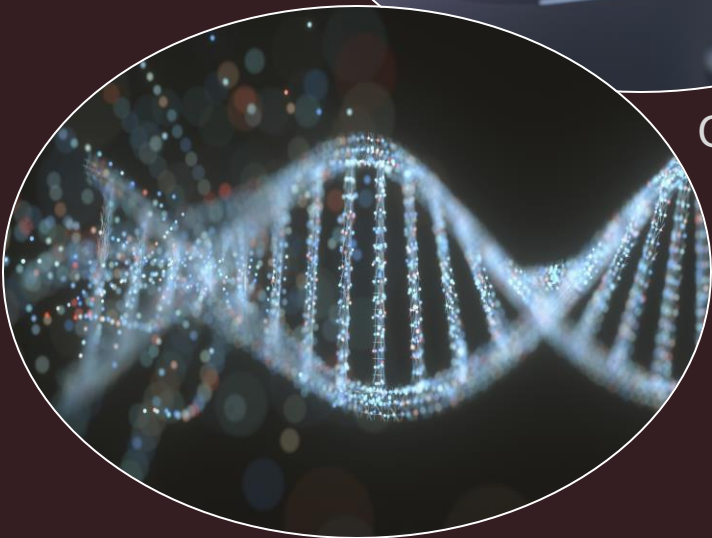
The Background... Pre 2024

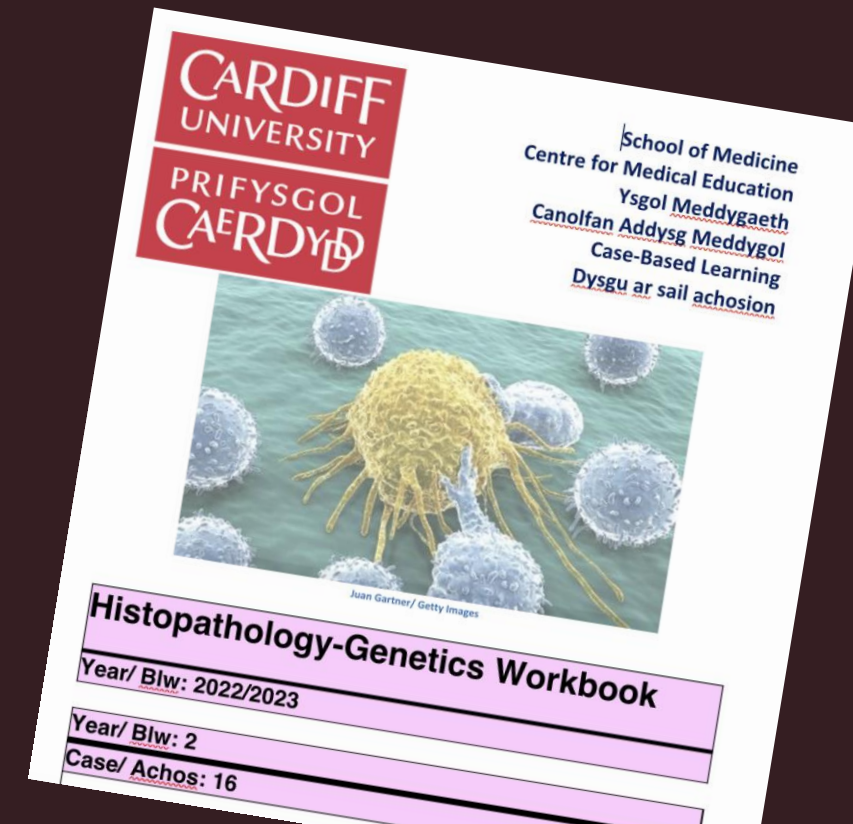Histopathology involves the examination of tissue samples under a microscope

Both disciplines play crucial roles in diagnosing and understanding diseases.
Introduced to Year 2 Medical students during an oncology case using a flipped classroom approach with a Workbook to promote self directed study, and a subsequent online Q+A session.

Genetics is the study of our genes and their functions.

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYD

School of Medicine
Centre for Medical Education
Ysgol Meddygaeth
Canolfan Addysg Meddygol
Case-Based Learning
Dysgu ar sail achosion

Juan Gartner/ Getty Images

Histopathology-Genetics Workbook

Year/ Blw: 2022/2023

Year/ Blw: 2
Case/ Achos: 16

The Inspiration... July 2023

At a SFHEA workshop, Owen Crawford, Digital Learning Manager, presented work developing the virtual hospital for Wales. This was described as:

"a platform that empowers staff to create their own immersive, interactive scenarios using a straightforward interface"

.

So I Asked the question

Can we create a virtual lab to teach histopathology and genetics.

The initial storyboard was developed…

Scene	Aim	Notes
Scene 1 – a short video or audio clip? Picture of a phone?	Conversation and endosco[...] collection of [...] analysis?	
Interactive questions	To test know[...] presentation	

Scene 6 – click on computer	Click on computer and make decision about what best next steps	Multi-choice question about best next steps – one of which is surgery. (**QUESTIONS TO BE WRITTEN**)
Information drop - The patient underwent a right hemicolectomy.		
Scene 7	Still on computer – appearance of surgical specimen	The patient underwent a right hemicolectomy. Image 1 is a photograph of part of the resection specimen. Questions:
	processing	

y bowel disease

biopsied. Go to the lab to

at are the key things you need fore entering the laboratory. nd click on items you think are

abcoats, gloves, click on sign d drink etc. before continuing.

me hood

to ask questions:

steps of tissue processing e ready for staining?

◦Fixation with formalin

The Photoshoot was scheduled...

In September 2023, Owen and team linked the panorama photos of the 3 areas of the lab use the arrows on the floor to move between them.

Thank you to Prof Rachel Errington and Prof Aled Clayton for agreeing for us to photograph their laboratory.

The VR-Lab was built…

Owen and team took the information from the story board and the photos to combine these into a virtual environment. Updates were sent to check progress was on track.

360-degree photos

3D Vista

XERTE

The VR-Lab content was refined…

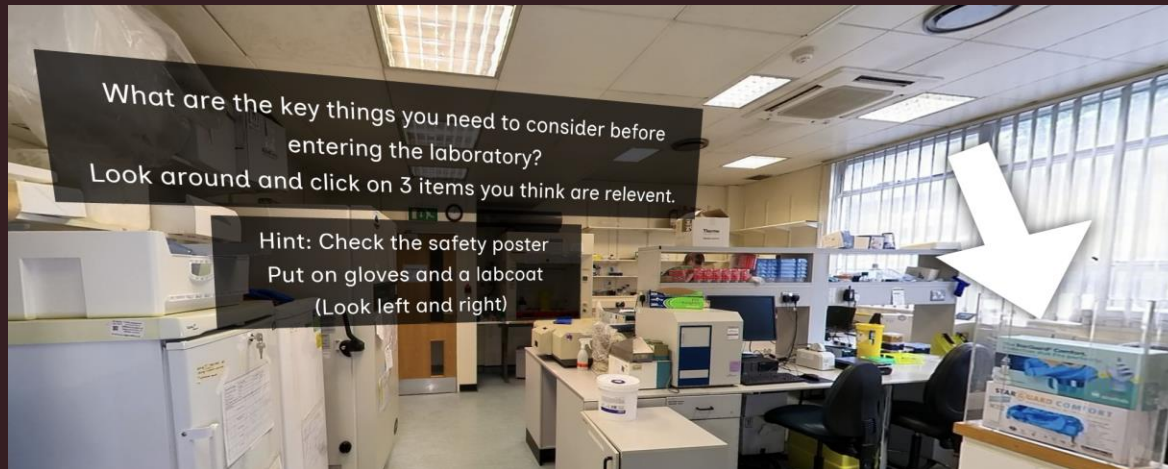Using Xerte, I was able to directly update / modify the text; (both the notifications and the questions).

Feb 2024, we ran a pilot with some year 3 medical students…
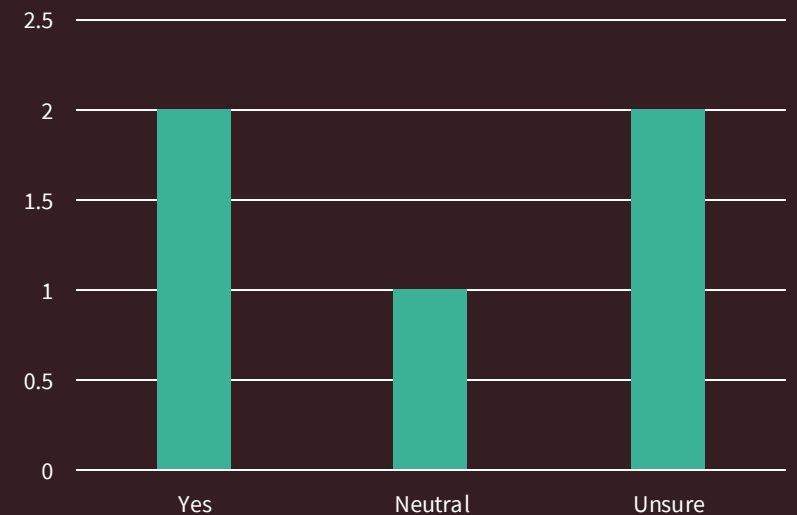
we have our first response 🙂

All looking good on n=1
No glitches, useful, helpful revision aid, took 15mins.
provided content in an engaging way.

5 students completed the feedback questionnaire. This student feedback was used to further refine the resource, including things like hints and pointers that appear if progress wasn't being made…

What are the key things you need to consider before entering the laboratory?
Look around and click on 3 items you think are relevent.

Hint: Check the safety poster
Put on gloves and a labcoat
(Look left and right)

The resrouce was easy to naviage?

	Yes	Neutral	Unsure
Value	2	1	2

The workbook content was updated to match the VR-lab content…

Workbook - written prompts to explore the steps in a laboratory process

VR-lab - Drag and drop options within the VR lab
With opportunity to check the right answers

The tissue same had been placed in a small container containing formalin to preserve the tissues. Following a gross examination of the tissue, the pathologist processes the same ready for microscopic examination.

Question 6: Reorder the following steps into the correct sequence:

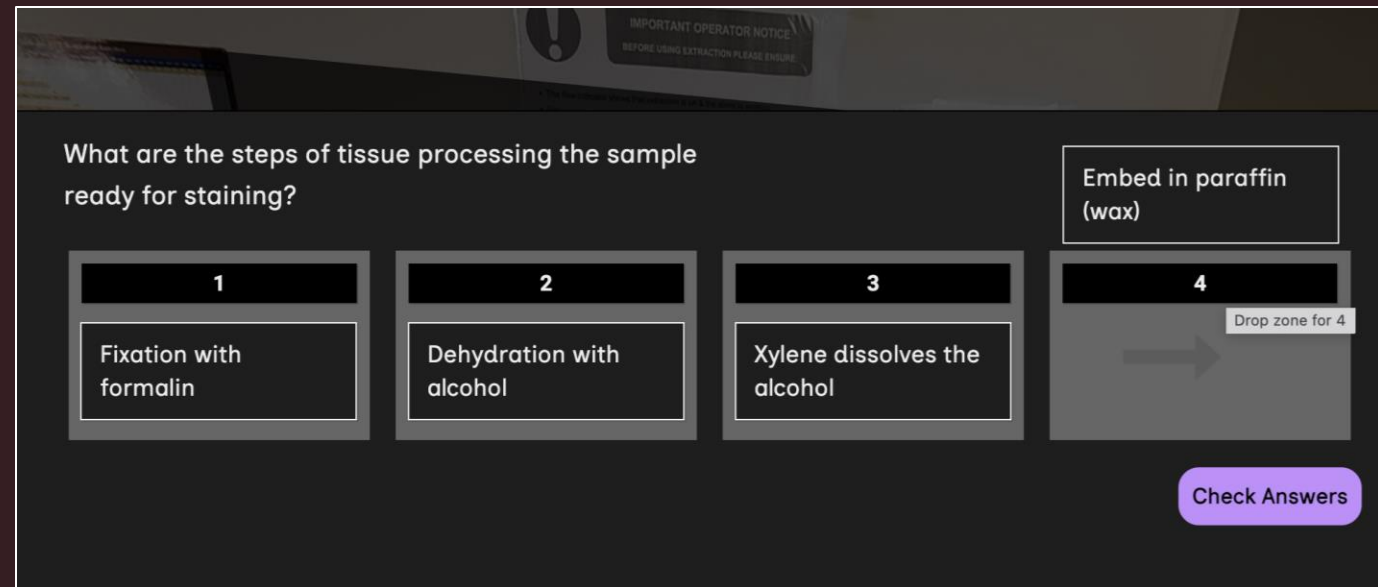|	
Xylene dissolves the alcohol	Embed in paraffin (wax)
Tissue is stained with Haematoxylin and Eosin	Fixation with formalin
Thin sections of tissue are cut using a microtome	Dehydration with alcohol

Step 1 -

Step 2 -

Step 3 -

Step 4 -

Step 5 -

Step 6 -

What are the steps of tissue processing the sample ready for staining?

Embed in paraffin (wax)

1	2	3	4
Fixation with formalin	Dehydration with alcohol	Xylene dissolves the alcohol	Drop zone for 4

Check Answers

The workbook content was updated to match the VR-lab content…

Workbook - written prompts to explore features of malignacy

VR lab – interactive features to engage with the content with addition information provided.
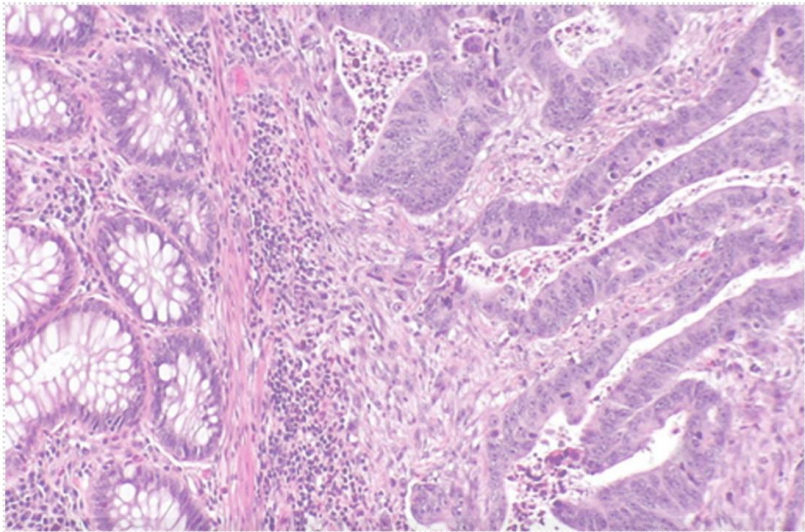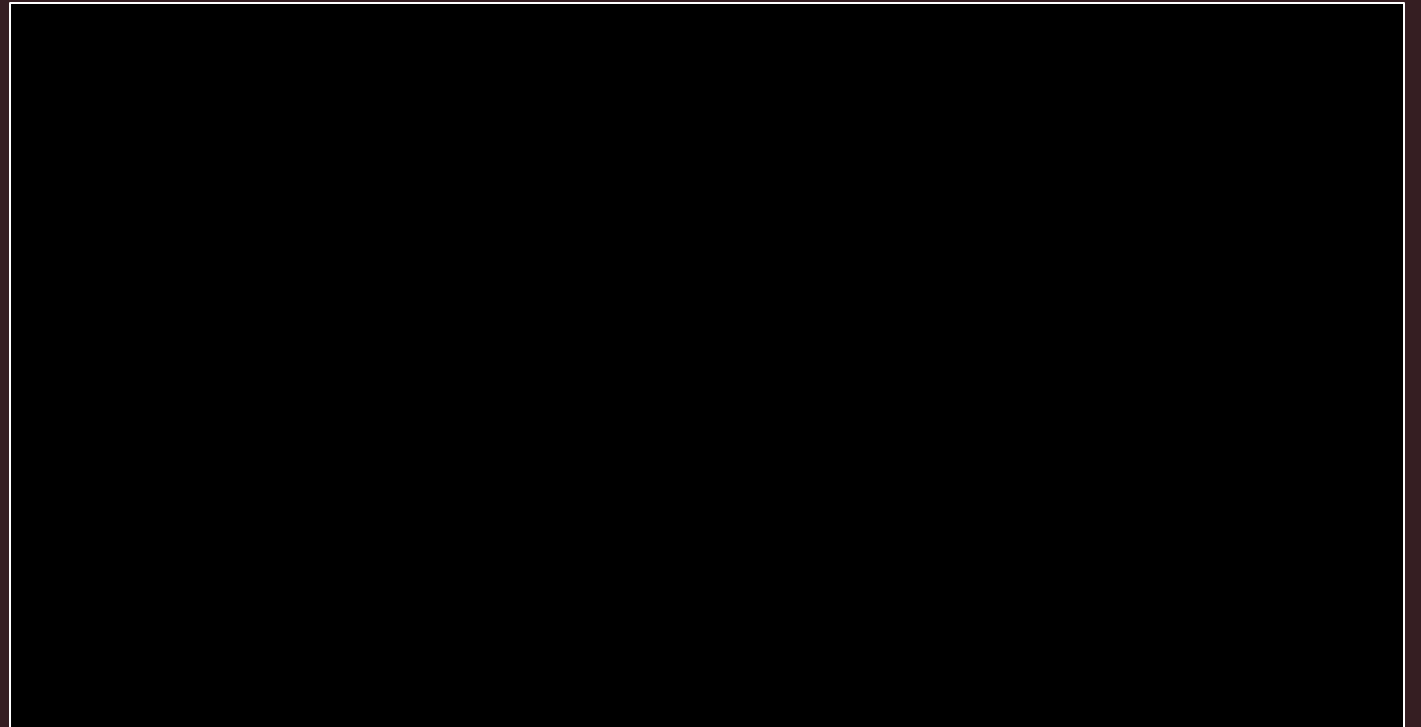

Image 4 from https://librepathology.org/wiki/File:Colorectal_adenocarcinoma_-_alt_-__intermed_mag.jpg

Question 14a: Can you identify 6 features shown in image 4
Question 14b: Can you list 5 microscopic features of malignancy

The patient consented to take part in a research study which aimed to investigate the genetic profiles of colorectal cancer
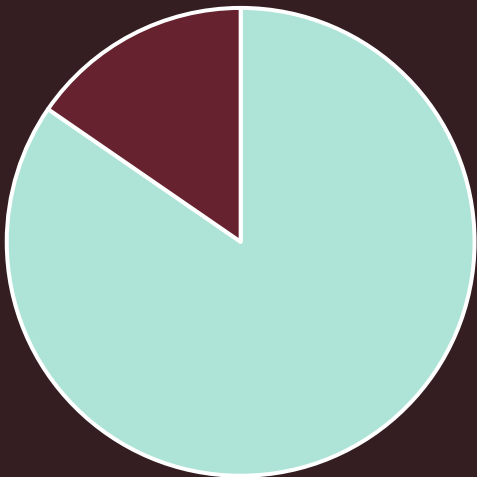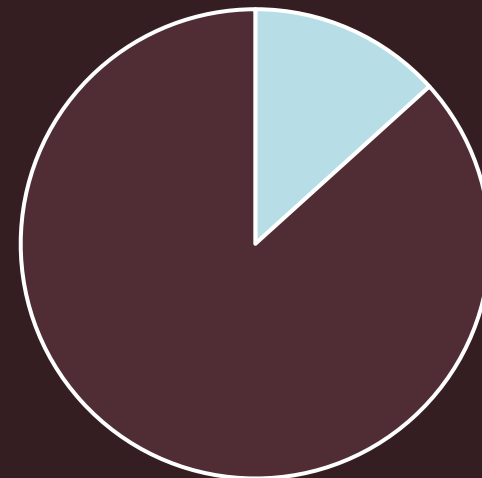
The VR-lab went live April 2024…

Using Learning Central (Blackboard ultra), links to the VR lab, the workbook (word document) and an anonymous feedback survey were released to the year 2 cohort (circa 290 students).

Students had allocated, timetabled time to complete the asynchronous activity one week before an in-person Q&A session.
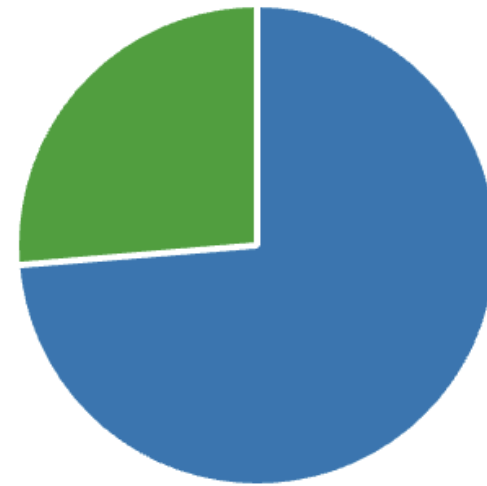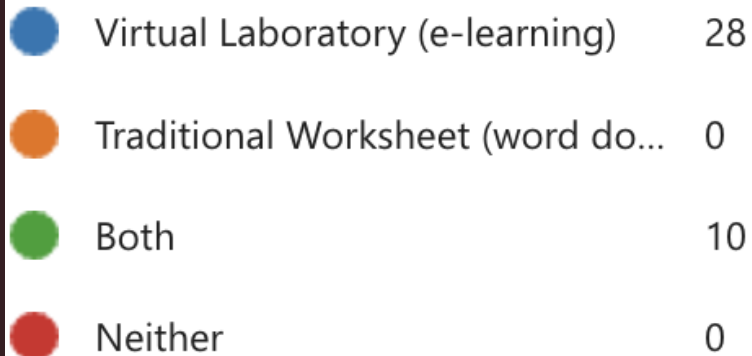
86.2% of students engaged
with the content
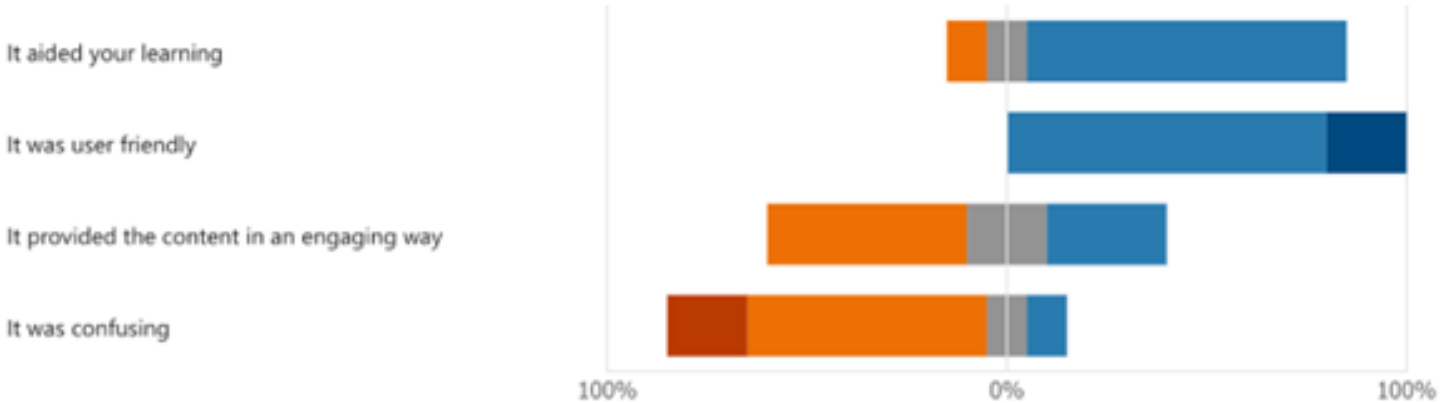
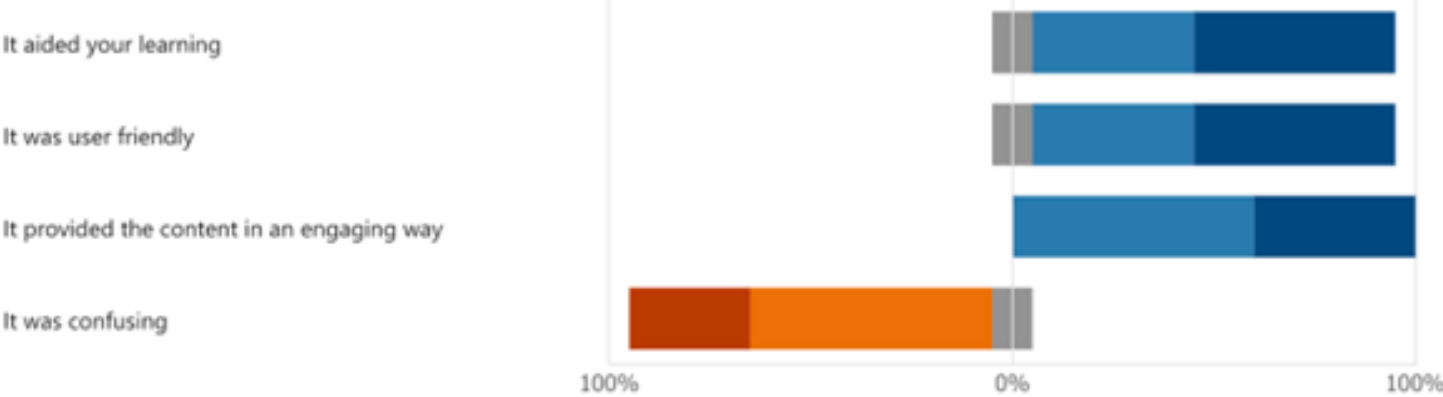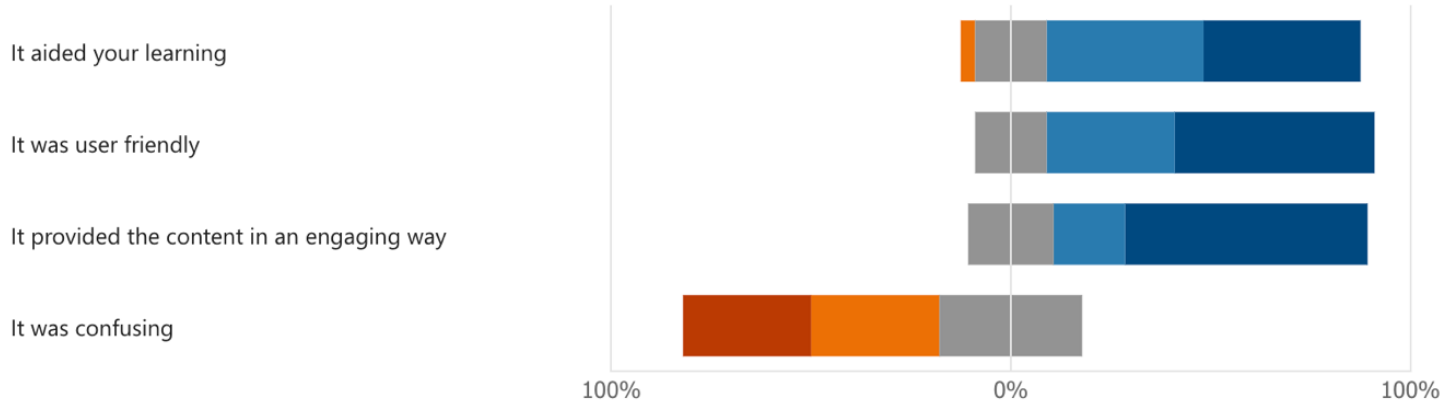13.3% of students completed
the feedback form

All students who provided feedback had used the VR-lab…

How did you choose to engage with the Histopathology / Genetics workshop? (0 point)

More Details

- Virtual Laboratory (e-learning)   28
- Traditional Worksheet (word do…   0
- Both   10
- Neither   0

Legend: Strongly disagree | Disagree | Neutral | Agree | Strongly agree

VR-lab feedback from VR-lab only respondents

- It aided your learning
- It was user friendly
- It provided the content in an engaging way
- It was confusing

VR-lab feedback from respondents who used both resources

- It aided your learning
- It was user friendly
- It provided the content in an engaging way
- It was confusing

Workbook feedback from respondents who used both resources

- It aided your learning
- It was user friendly
- It provided the content in an engaging way
- It was confusing

Students rated the VR-lab as more engaging than the workbook

Timeline recap and conclusion

July 2023 - the idea conceived and storyboarding initiated

Sept 2023 - Image acquisition complete and resource development began

Feb 2024 - Resource tested with year 3 students

April 2024 - delivered to year 2 cohort

Evaluation data complete

Student feedback indicated very high satisfaction rates and encouragement to develop more resources akin to the VR-Lab

Quotes from Student feedback

"we need more of these"

"it was very interactive and very clear in terms of delivering information."

"Please keep up the good work in trying to better and revolutionise our learning"

"Found this resource extremely engaging and helpful!"

"Thank you for the resource, it's amazing!"

For more information and examples of this and other immersive learning projects: LTAcademy@cardiff.ac.uk

Or search "Immersive learning" on the intranet

Thank you