In silico laboratory training
Teaching practical skills, remotely

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Aim

This project aims to evaluate which mobile media format will be best suited towards teaching students fundamental practical techniques, commonly used in biological laboratories.

Methodology

Participants (N = 140) will be randomised into seven groups (n = 20), each of which will be trained in basic laboratory skills (micropipette use, single colony isolation using streak plate method).

140 participants

1 Control group
The control group will be trained on how to perform two laboratory techniques using standard pedagogical approaches. In short, these individuals will attend a lecture where the concepts will be theoretically explained, using a blackboard and a live demonstration.

2 Linear Video
Randomised participants will view a video of the techniques. The content will be similar to that of the control group.

3 "Making choices" video
Participants in this group will be allowed to choose the next steps of the video. This will allow viewers to make mistakes, and ultimately learn from these mistakes.

4 360° Video
Participants will view 360°, linear videos showcasing the techniques from the point of view of the person performing the techniques.

5 "Making choices" 360° video
Participants will view 360° videos of the techniques, from the point of view of the demonstrator. These videos will allow for the viewers to make choices at key points, allowing them the opportunity to learn from making the wrong choices.

6 Mobile game
Participants in this group will be trained using a mobile game (Android-based). This experience will be augmented using a bluetooth input device with a stylus.

7 Virtual reality experience
The techniques will be demonstrated and the participants will be allowed to practice in virtual reality with input devices simulating the physical equipment.

Evaluation

All participants will be randomly assessed on their performance of the technique by a trained facilitator. The facilitator will not know which teaching method the student was assigned to. Assessment will be conducted in line with current practices at the University of Johannesburg. Assessment will be conducted following the training, and one month after training to evaluate retention of skills.

Statistical analyses

The results obtained from the evaluation will be used to determine statistically how the participants assigned to the various training methods performed the two techniques that needs to be mastered. This process will be overseen by trained statisticians from StatCon at the University of Johannesburg.

Dissemination

The results will be compiled into a research report, for dissemination on public facing websites of the University of Johannesburg and the British Council. Furthermore, the scientific results will be published in peer-reviewed, academic journals to help guide future endeavours in digitising skills in the sciences and engineering.

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