Exploring the "Paperless" Lab

New Ideas and Novel Pedagogy

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Background

Our current practical arrangements are excellent and we are often praised by External Examiners on our approach to a practical-focussed curriculum throughout all four years of our Medical Science undergraduate degree programmes. However, whilst practical class teaching is seen as the cornerstone of our teaching, it does bring with it serious pressures in the form of staff resource required to manually process large amounts of paper-based lab classes, for both marking and administration time. There are also practical constraints as students need to have the ability to work with hazardous chemicals and equipment at the same time as accurate recording and analysis of lab results.

One potential solution to this is to "go paperless" and lose all physical lab manuals and assessment documentation through the use of a new system called Lt (from AD Instruments, see Fig. 1). It is hoped that this intervention will reduce staff marking time, reduce turnaround times for feedback, and also aid the student experience through the positive use of technology with a digitally native student population.

Fig. 1 – Lt cloud-based user interface

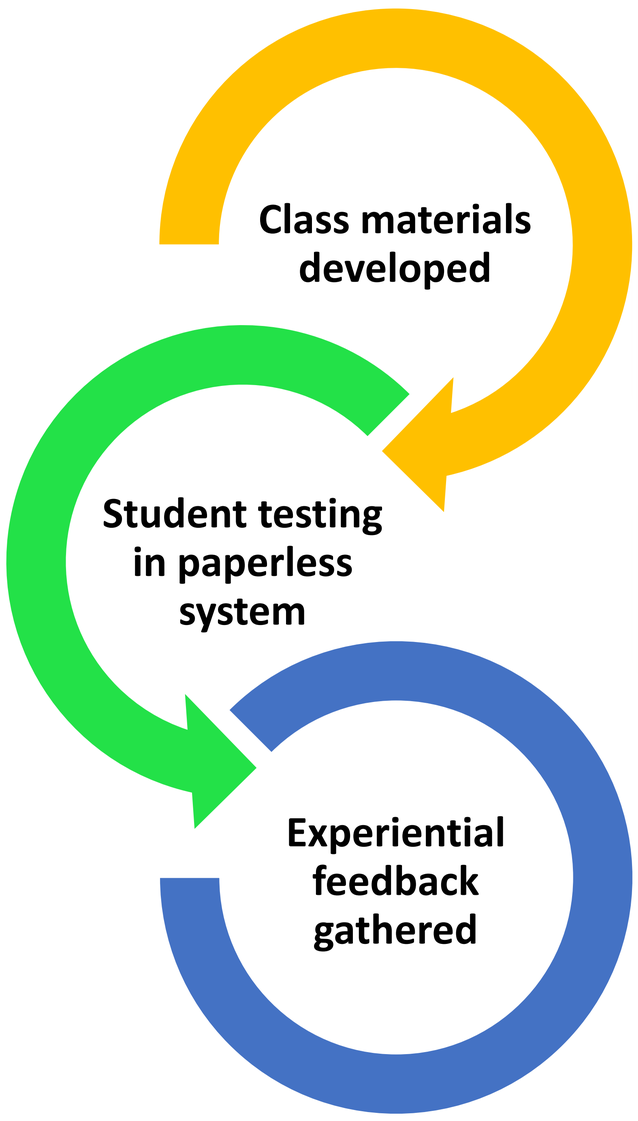
Fig. 2 – Lt linked to PowerLab hardware

This project aimed to test the Lt system within a current laboratory classroom setting through the creation of a cloud-based lesson that was delivered online. The system also allowed for real-time recordings of biological measurements through inputs from PowerLab recording hardware (Fig. 2).

Aims

- **Pilot a digital paperless class solution for a current laboratory class**
- **Gather feedback from student experiences**
- **Provide evidence to help guide strategic developments of paperless lab technology**

Study Design



"Who's the Strongest?" grip strength/muscle physiology practical adapted from our Introduction to Medical Sciences (SM1001) first year undergraduate course

28 student volunteers tested the paperless class alongside their peers who carried out the traditional paper-based class

Online feedback form used to gather opinions on the paperless classes (see Fig. 3)

Survey Results

An online survey was used with mixed questions using a Likert scale (Fig. 3) and free text (Fig. 4) to gather feedback from all volunteer students (n = 27). Students were asked to rate various aspects of the paperless lab class as well as compare it to a standard paper-based version of a class, with overwhelmingly positive results.

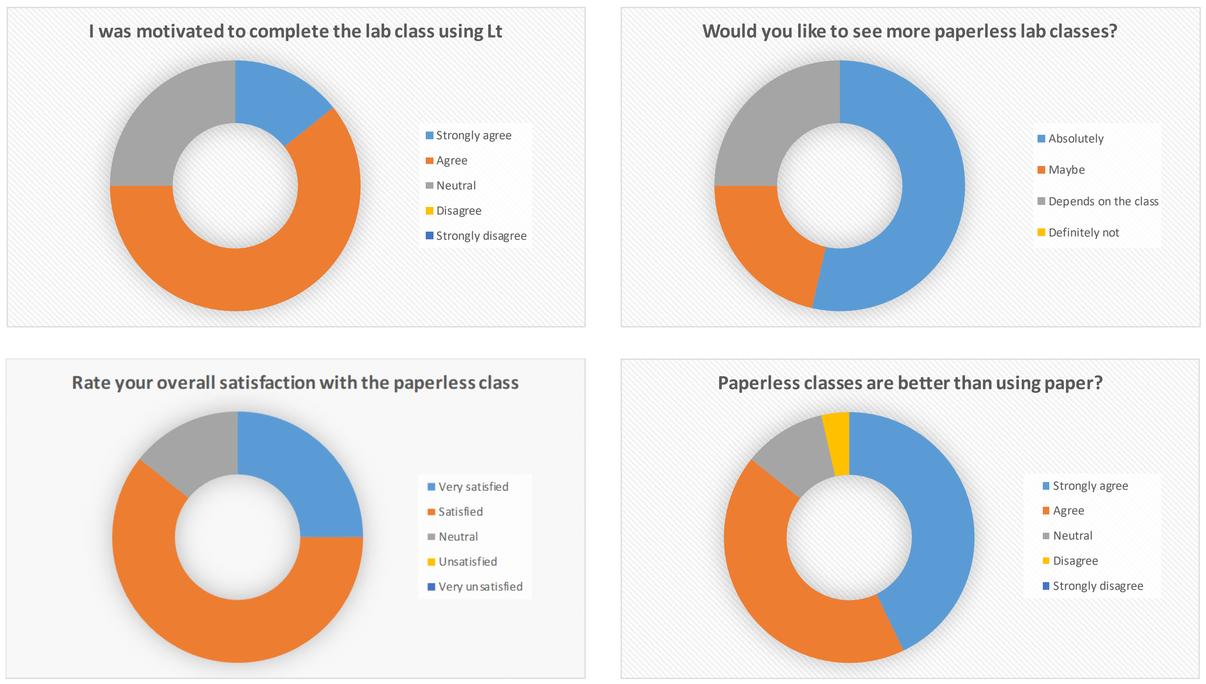


Fig. 3 – Likert scale survey results from student volunteers

"The idea of completing the lab online and filling in all results and having the explanations in that format is great and environmentally friendly."

"I think having the instructions online isn't so bad but coming to drawing graphs and analysing data I think it is easier to see it on paper."

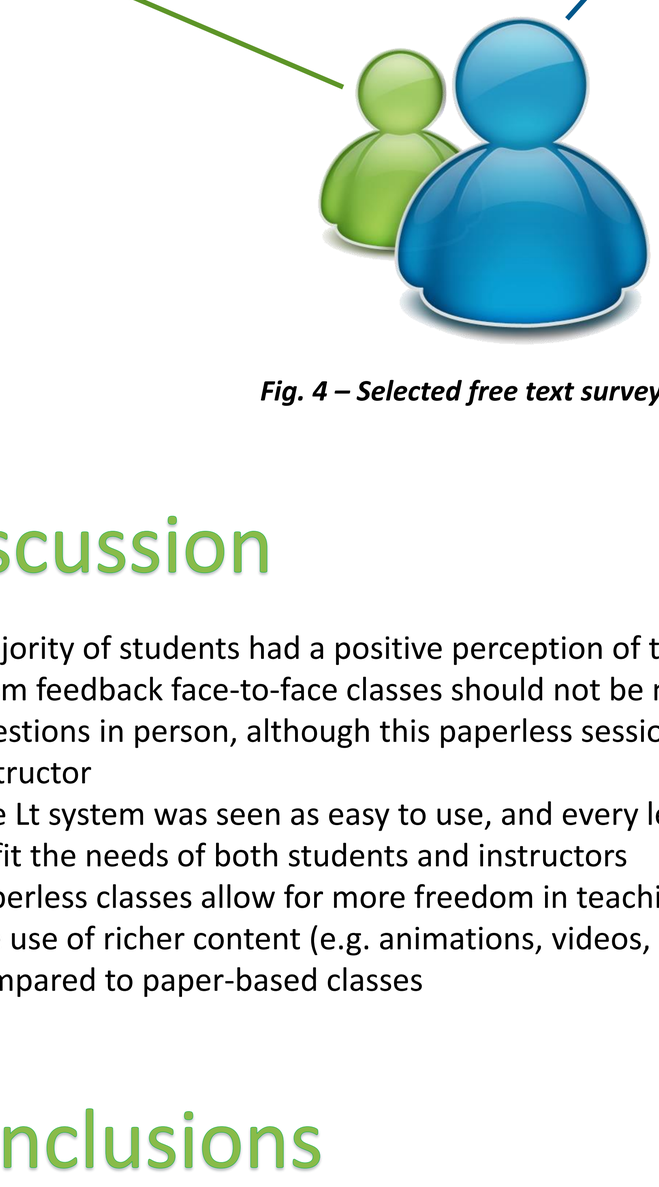


Fig. 4 – Selected free text survey results

Discussion

- Majority of students had a positive perception of the paperless laboratory class
- From feedback face-to-face classes should not be neglected as it is useful to ask questions in person, although this paperless session was still guided by an instructor
- The Lt system was seen as easy to use, and every lesson can be fully personalised to fit the needs of both students and instructors
- Paperless classes allow for more freedom in teaching and understanding through the use of richer content (e.g. animations, videos, links to external content) compared to paper-based classes

Conclusions

- Paperless solutions hold real promise to augment classes to make them more appealing and thereby increase student satisfaction
- Paperless classes could streamline assessment processes as students would no longer hand in documents that staff need to distribute for marking, and student feedback and grades could be created quickly
- Lt would allow flexible delivery of the same material/experience to students in different geographical locations, or at their own pace, and would be suitable for delivering/assessing much of the science/medical/anatomy/clinical skills curriculum