

# Use of LabTutor improves student engagement and achievement in ECG and EEG practical classes

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## Introduction

- When students are being taught physiological measurement techniques, they may find it difficult to stay enthused and engaged when trying to perform such novel/complex tasks.
- Problems with equipment setup, calibration, and perceiving relevance to real-life situations can mean that students become disheartened, overwhelmed or fail to understand the point of the exercise.
- This may be common where students are drawn from a variety of disciplines and a variety of abilities/skills.
- The LabTutor computer-based system (AD Instruments, NZ) provides step-by-step instructions for the students to help learn such techniques (Fig. 1). Patient cases are integrated into the practical tasks, along with audio-visual resources.
- Practical results and student answers may be uploaded electronically for instructor marking later.
- This study aimed to investigate whether use of LabTutor could improve student engagement and achievement in practical classes and address the issues listed in Fig. 2.**

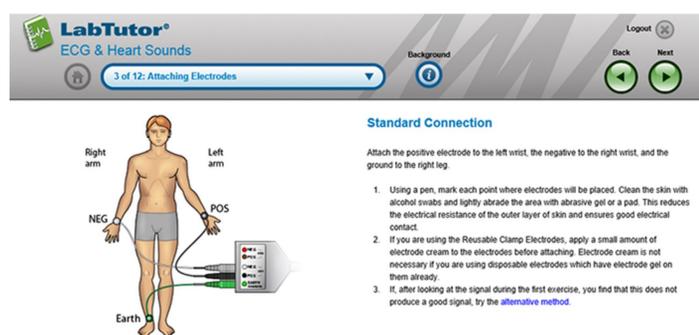


Figure 1. Typical screenshot from a LabTutor practical.

Students and staff report that the inclusion of graphic and audio-visual resources in the online practical guide helps students better understand practical protocols and the rationale behind them. We no longer rely on long, paper-based practical manuals or submitted work, and students can easily work through the experiment at their own pace. Image courtesy of AD Instruments.

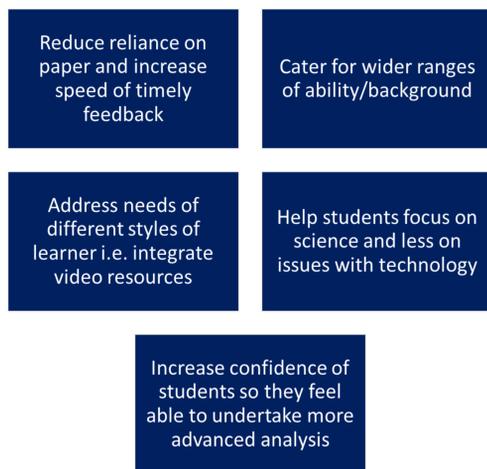
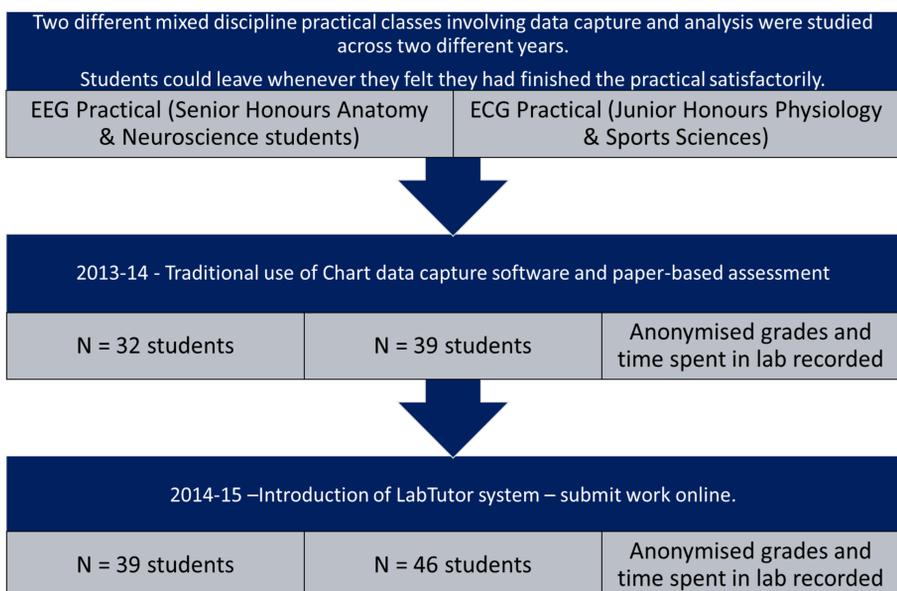


Figure 2. Motivating factors for introduction of the LabTutor system into biomedical practical classes.

## Methods



## Results

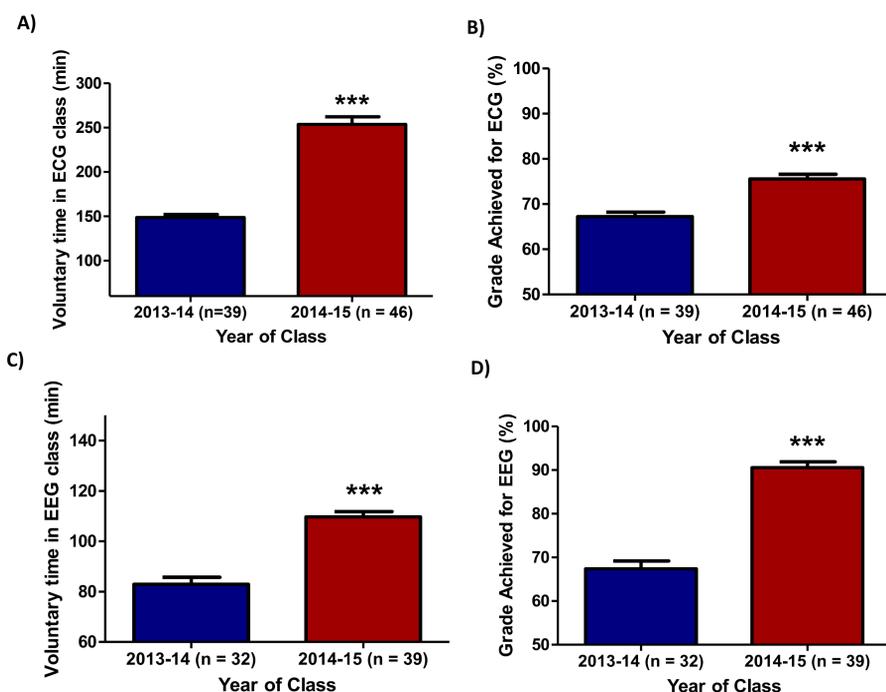


Figure 3 (A-D) - Anonymised mean grade ( $\pm$  SEM) and time spent in ECG and EEG practical classes by students before and after introduction of the LabTutor system.

- Use of LabTutor produced extremely significant increases in both the grade achieved by students and the time spent voluntarily in completing the practical tasks in both classes ( $P < 0.001$ , Mann-Whitney test) (see Figs. A-D).
- ECG class duration increased from  $148.7 \pm 3.48$  min to  $253.6 \pm 8.7$  min (Fig 3A), and grade increased from  $68.2 \pm 1.1\%$  to  $75.0 \pm 1.2\%$  (Fig 3B).
- EEG class duration increased from  $82.9 \pm 2.8$  min to  $109.7 \pm 2.0$  min (Fig 3C), and grade increased from  $67.4 \pm 1.8\%$  to  $90.6 \pm 1.3\%$  (Fig 3D).
- Anonymised feedback from student course feedback questionnaires was overwhelmingly positive regarding use of LabTutor, compared to previous years' comments where some students felt overwhelmed when trying to learn such measurement techniques. Four main themes were identified from this free text feedback (Fig. 4).

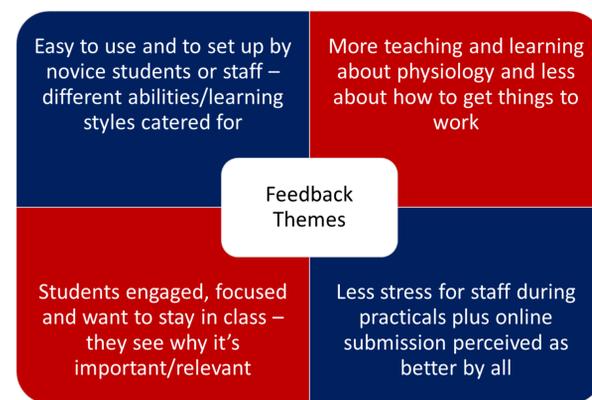


Figure 4. Themes derived from free text comments in annual anonymous student feedback questionnaires.

## Discussion

- LabTutor improved student engagement and achievement when learning physiological measurement techniques, even when the class included students with less specialist practical physiology experience (e.g. intercalating medical students or direct entry students from FE colleges).
- Integration of clinical scenarios and audio-visual resources enhances student appreciation of the activities.
- Staff reported that students of all backgrounds required less help and found it much easier to work through the tasks, with the focus being more on understanding concepts rather than worrying excessively about equipment set-up or calibration.
- Anecdotal evidence suggests that a wider range of academic and technical staff from different disciplines feel more confident about taking part in physiology practicals when using the LabTutor system.
- Use of LabTutor may enable increased provision of effective practical skills training to a wider range of students.