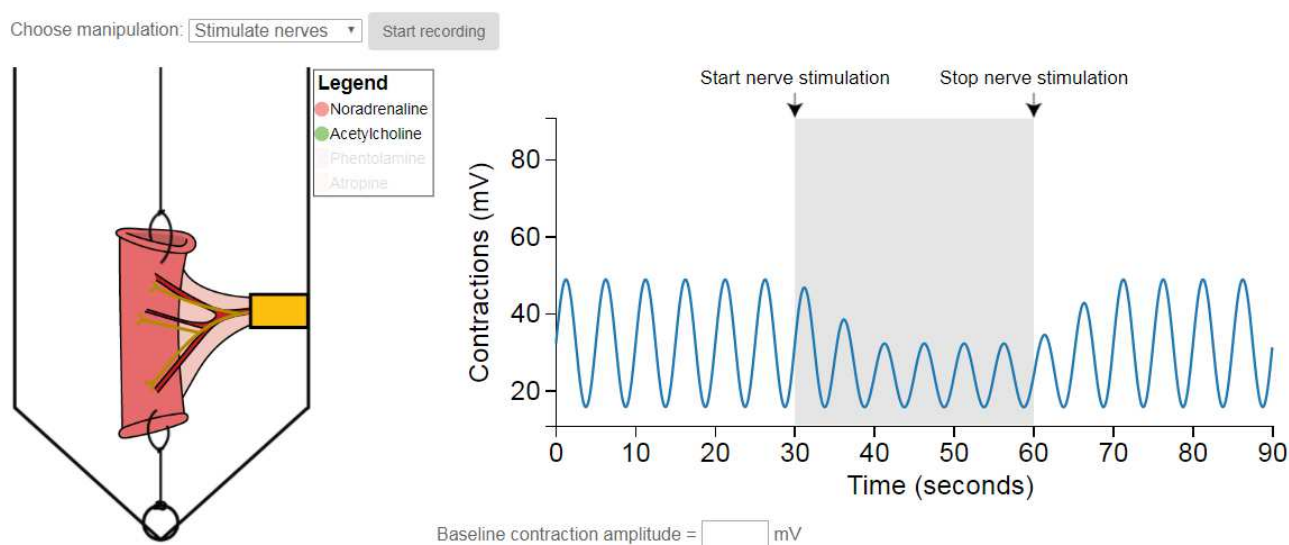


## Using an online simulation to prepare students for an enquiry-based laboratory class

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Science units commonly involve some component of teaching through direct experience and observation of scientific phenomena, usually in “hands-on” or “wet lab” practical classes. One factor that limits the value of such classes is that many students arrive lacking an understanding of the underlying theoretical concepts. Students then tend to follow the experimental steps as if following a recipe, without giving much thought to the relationship between the experimental procedure and the research hypotheses.

To address this issue, we developed an online simulation for students to complete in advance of a practical class that examines the neuronal control of gut motility in the isolated rabbit ileum (see the virtual experiment at [ilearn.med.monash.edu.au/physiology/GastroSmoothMuscle/](http://ilearn.med.monash.edu.au/physiology/GastroSmoothMuscle/)). We also transformed the existing practical class from a recipe-based to an enquiry-based practical laboratory exercise. Rather than following an extensive set of instructions, we introduced students to the context of the experiment, and asked them to produce research hypotheses and an experimental design that allowed them to determine which type of autonomic nerves modulated motility in their preparation.



We administered anonymous surveys at the beginning of the practical class to examine the relationship between the (self-reported) time spent on the online simulation and the understanding of the practical preparation and underlying physiological concepts. Analysis of this survey data showed that student understanding of the theoretical concepts underlying the practical class was significantly correlated with how long they spent on the virtual experiment, but not with how long they spent reading the practical notes. Anecdotal feedback from the teaching associates also suggested that the virtual experiment improved student understanding of the practical preparation compared to previous cohorts.

This suggests that self-paced online interactive simulations are an effective way to ensure student understanding of theoretical concepts in advance of practical classes, allowing for a more realistic experience of the scientific method and a more effective use of the time spent in the laboratory.