MONASH University

MONASH
MEDICINE,
NURSING & HEALTH
SCIENCES

Implementing a successful e-learning strategy:
overcoming the common barriers

Assoc Prof Liz Davis

Monash University, Melbourne, Australia

elizabeth.davis@monash.edu

GROUP OF EIGHT AUSTRALIA

e-learning

noun
noun: **elearning**

learning conducted via electronic media, typically on the Internet.
"successful e-learning depends on the self-motivation of individuals to study effectively"

Translations, word origin, and more definitions

Why e-learning?

self-directed

self-paced

timely feedback

flexible

active learning

⇒ **increased engagement**

⇒ **improved learning**

MONASH University

SO WHY ISN'T EVERYONE ON BOARD?

REASONS FOR RELUCTANCE TO USE E-LEARNING

MONASH University

Academic concerns:

- Need a reason to change their teaching
  - *"I learnt all right without it"*
- Want evidence of benefits
- It takes time, training and confidence:
  - *what e-learning is appropriate?*
  - *where do I get relevant resources to use?*
  - *how are these best incorporated into my teaching?*

Student concerns:

- Accessibility
- Workload

Department of Pharmacology

Faculty of Medicine,
Nursing & Health Sciences
Monash University, Melbourne Australia

Bachelor of Medicine, Bachelor of Surgery
(undergraduate & graduate entry)

Bachelor or Radiography & Medical Imaging

Bachelor of Physiotherapy

Bachelor of Nutrition & Dietetics

Bachelor of Emergency Health (Paramedics)

lectures

Bachelor of Science/
Bachelor of Biomedical Science

lectures,
tutorials
practicals

OUR COURSES ARE ON-CAMPUS / FACE-TO-FACE

MONASH University

EXAMPLES OF OUR E-LEARNING ACTIVITIES:

- to support pharmacology practical classes
- to supplement content delivery

e-Learning to support pharmacology practical classes

TRADITIONAL PRACTICAL CLASSES

- Practical Manual contains:
  - Detailed background
  - Step-by-step protocol
- On the prac day:
  - *Pre-prac talk*
  - Prac….
  - *Post-prac talk*
- Assessment = Prac report

PHA3011 Unit Guide 2012

Week 4: Selectivity of Action: Noradrenaline

Objectives:

By the end of this practical you should be able to:

- rank order the activity of the catecholamines adrenaline, noradrenaline and isoprenaline at α- and β-adrenoceptors and relate this order to the structure of each drug.
- obtain and consider the evidence which indicates multiplicity of adrenoceptors.
- compare the effects of an uptake 1 blocker on the response to directly and an indirectly acting sympathomimetics.

Background & theory:

Dale (1910), in a classical study with the chemist Geoffrey Barger, investigated the activity of a series of compounds related to adrenaline on the uterus and on blood pressure. His conclusions were far-sighted and pre-empted a vast amount of research that has taken place since that time. He pointed out that there were essential parts of a molecule that had to be present for sympathomimetic activity and he noted that, when tried on a variety of preparations, the compounds did not always show the same rank order of potency. This was taken to be indicative of the presence of different receptors. He showed that antagonists, such as ergot, had different blocking actions on the vasoconstriction caused by adrenaline or by stimulation of various sympathetic nerves - sometimes causing reversal of the response and sometimes just reducing the response. He reported that the only substance that could mimic sympathetic stimulation better than adrenaline (the putative transmitter at the time) was noradrenaline, and he also put forward the idea that perhaps some sympathomimetic drugs may owe their activity to their ability to release the endogenous transmitter rather than their ability to activate receptors.

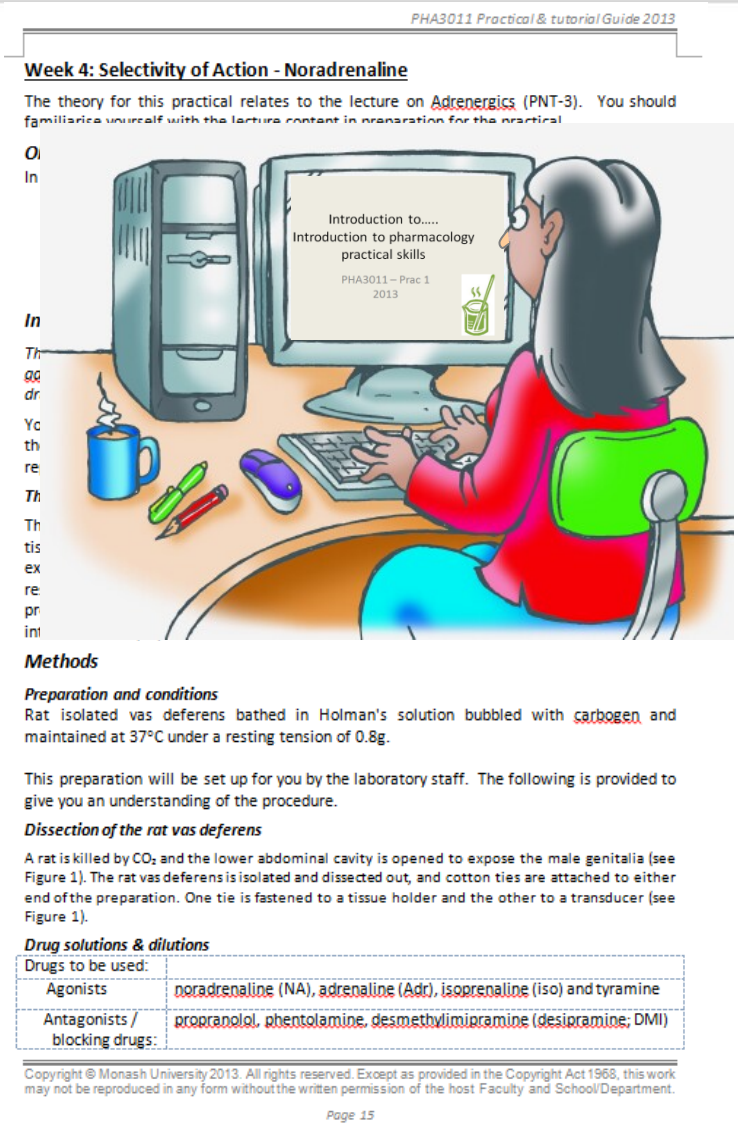
Blaschko in 1937 formulated the steps that might be involved in the synthesis of the sympathetic transmitter *in vivo*, but it was not until the 1960s that this was verified completely with the description of tyrosine hydroxylase, the enzyme catalysing rate-limiting step. It is now recognised that dopamine, noradrenaline and adrenaline are all transmitters in their own right. Noradrenaline and adrenaline are also neurohormones. It is of interest to compare the change in potency as the molecule approaches its final transmitter form from tyrosine to noradrenaline.

The diversity of receptors has been studied in great depth, aided by the synthesis of analogues of catecholamines. Ahlquist, in 1949, named the two major receptor groups, α & β on the basis of rank order of potency (ie. at α-adrenoceptors: noradrenaline ≥ adrenaline > isoprenaline; and at β-adrenoceptors: isoprenaline ≥ adrenaline > noradrenaline). In today's practical we shall conduct a small-scale experiment using noradrenaline, adrenaline and isoprenaline on the rat vas deferens. As the bulk of the group substituted on the terminal nitrogen of the catecholamine increases, α-adrenoceptor activity falls and potency as a β-adrenoceptor agonist increases. This can be confirmed by the use of antagonists such as phentolamine, which specifically blocks α-adrenoceptors, and propranolol, which blocks β-adrenoceptors. More recently sub-types of each receptor have been described and these will be discussed more in lectures relating to this topic.

Dale was also correct in his opinion that some sympathomimetics may act indirectly. Most do, to a greater or lesser extent. Noradrenaline is considered to be at one end of the spectrum, acting mainly directly. The other end of the spectrum is exemplified by tyramine, which is almost totally indirectly acting. Procedures which either deplete the amine stores in the sympathetic nerve or prevent access of the indirectly acting sympathomimetic to the stores (such as the administration

OUR REVISED PRACTICAL CLASSES

- Practical Manual contains:
  - Some background
  - Step-by-step protocol
- *Pre-prac talk as video:*
  - *Linked to an online quiz*
- On the prac day:
  - Prac….
- *Post-prac talk as video*
- Assessment = Prac report



Week 4: Selectivity of Action - Noradrenaline

The theory for this practical relates to the lecture on Adrenergics (PNT-3). You should familiarise yourself with the lecture content in preparation for the practical

Methods

Preparation and conditions

Rat isolated vas deferens bathed in Holman's solution bubbled with carbogen and maintained at 37°C under a resting tension of 0.8g.

This preparation will be set up for you by the laboratory staff. The following is provided to give you an understanding of the procedure.

Dissection of the rat vas deferens

A rat is killed by CO_2 and the lower abdominal cavity is opened to expose the male genitalia (see Figure 1). The rat vas deferens is isolated and dissected out, and cotton ties are attached to either end of the preparation. One tie is fastened to a tissue holder and the other to a transducer (see Figure 1).

Drug solutions & dilutions

Drugs to be used:	
Agonists	noradrenaline (NA), adrenaline (Adr), isoprenaline (iso) and tyramine
Antagonists / blocking drugs:	propranolol, phentolamine, desmethylimipramine (desipramine; DMI)

PRE-PRACTICAL VIDEOS

- Alquist (1948) proposed different adrenoceptor types based agonist potency

α	β
noadrenaline ≥ adrenaline > isoprenaline	isoprenaline > adrenaline ≥ noradrenaline

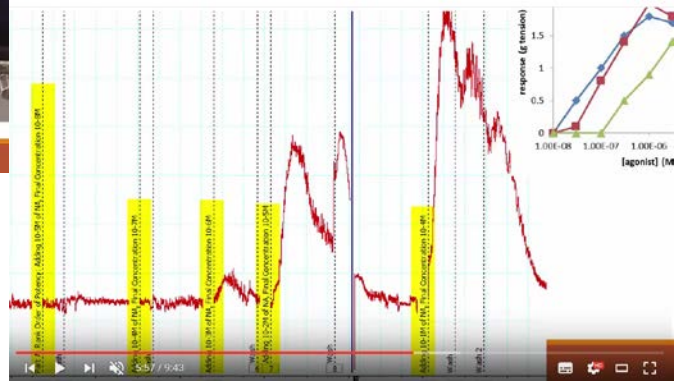
include:

–background theory

–practical aspects

preparation =

- isolated preparation known to have a dense sympathetic innervation
  - *bathed in Holman's solution*
  - *bubbled with carbogen*
  - *maintained at 37 ℃*
  - *set at 0.5-0.8g resting tension*

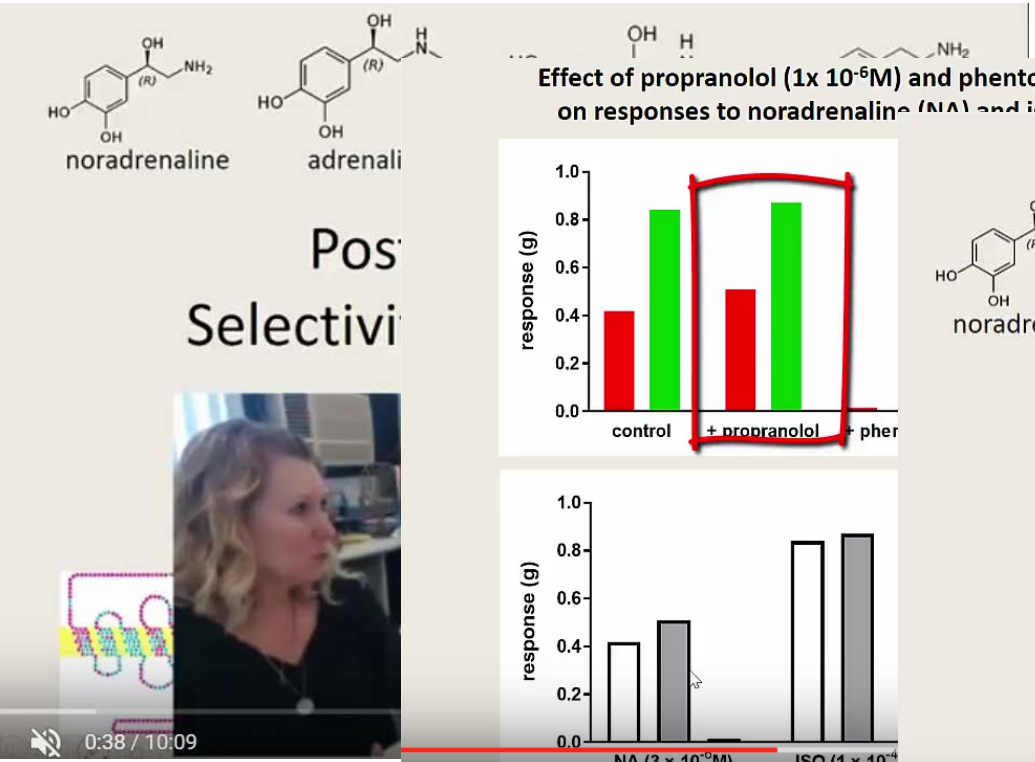


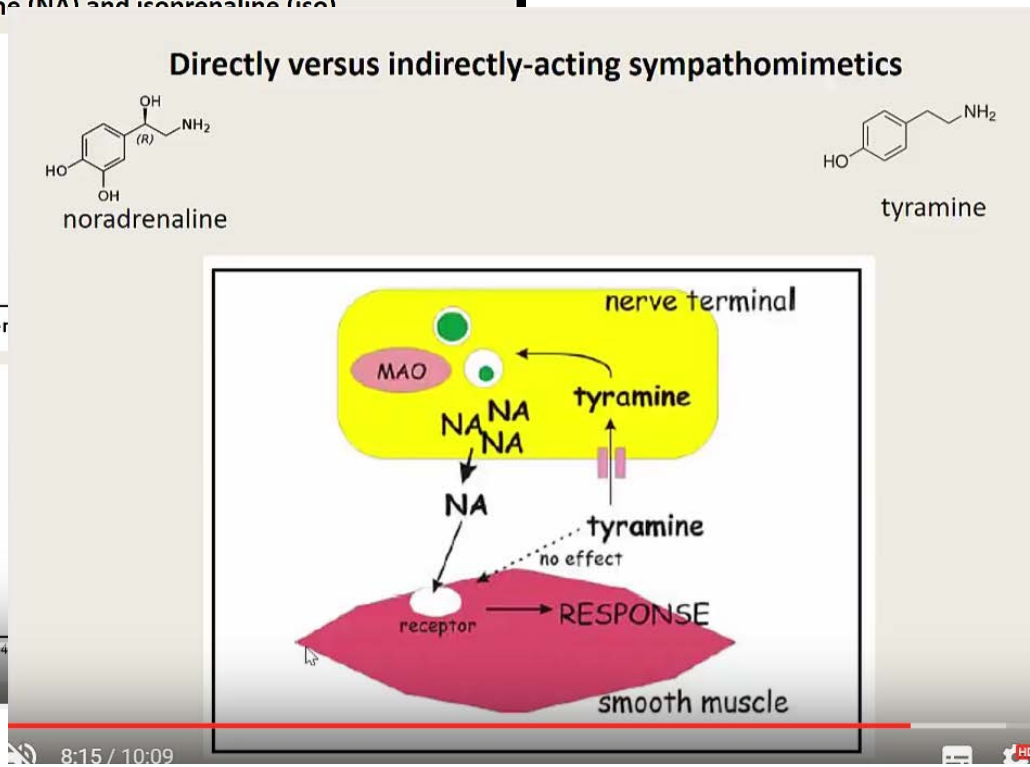
⇒ Online quiz (3 attempts); ≥80% = 1mark; <80% = 0

POST-PRACTICAL VIDEOS

MONASH University

- Video “discussion” of prac and data
- Examples of data presentation & interpretation
- Hints for preparation/presentation of prac report





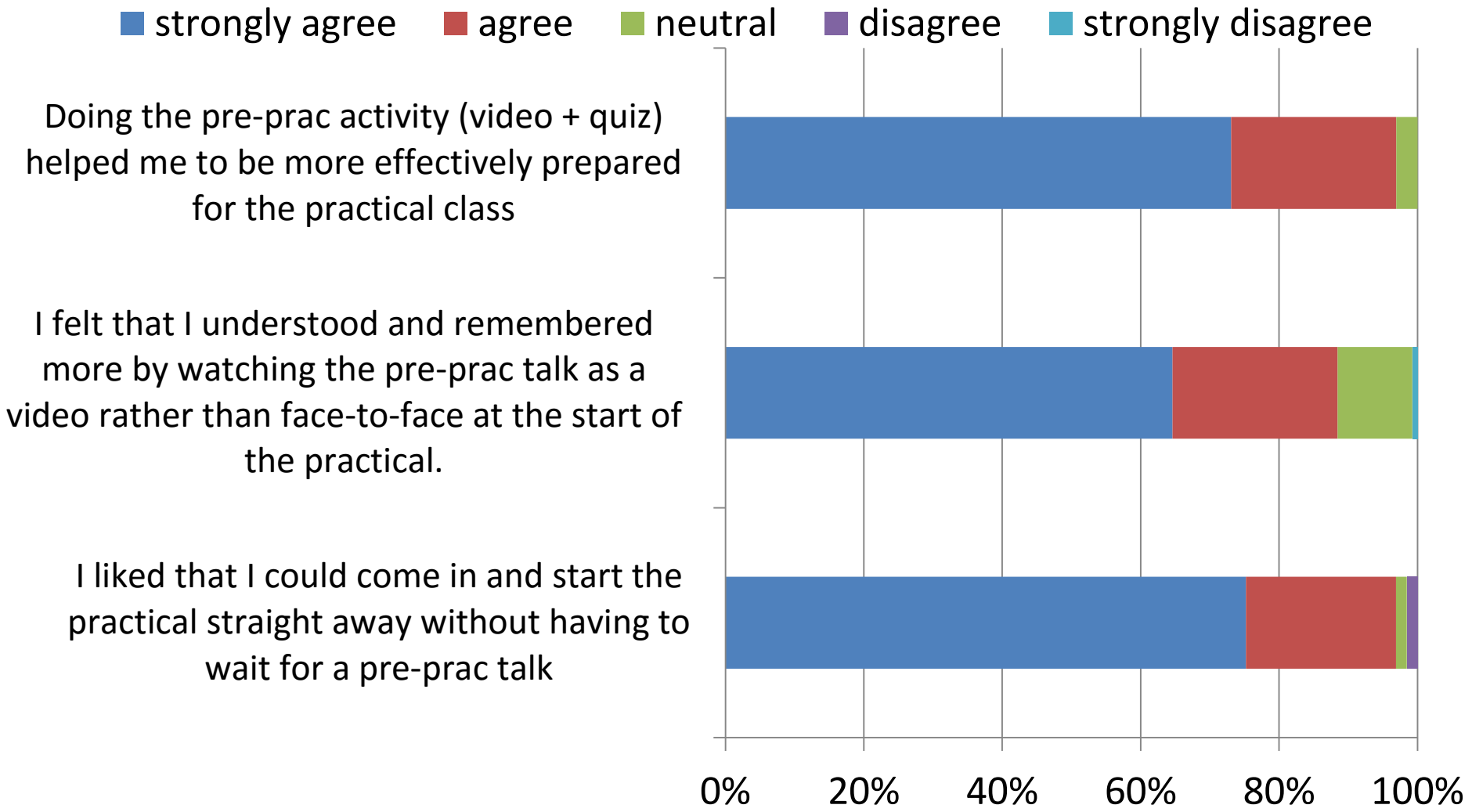
STUDENT USE OF PRE- & POST PRAC VIDEOS

Unit: Principles of Drug Action (2017)
Enrolment: 138

	Duration (min)	Av view duration (min)	No. of views
Prac 1			
Pre-prac video	10:07	6:07	286
Post-prac video	10:47	5:59	274
Prac 2			
Pre-prac video	9:44	6:22	321
Post-prac video	10:10	5:41	257

STUDENT FEEDBACK ABOUT PRE-PRAC VIDEOS (2013)

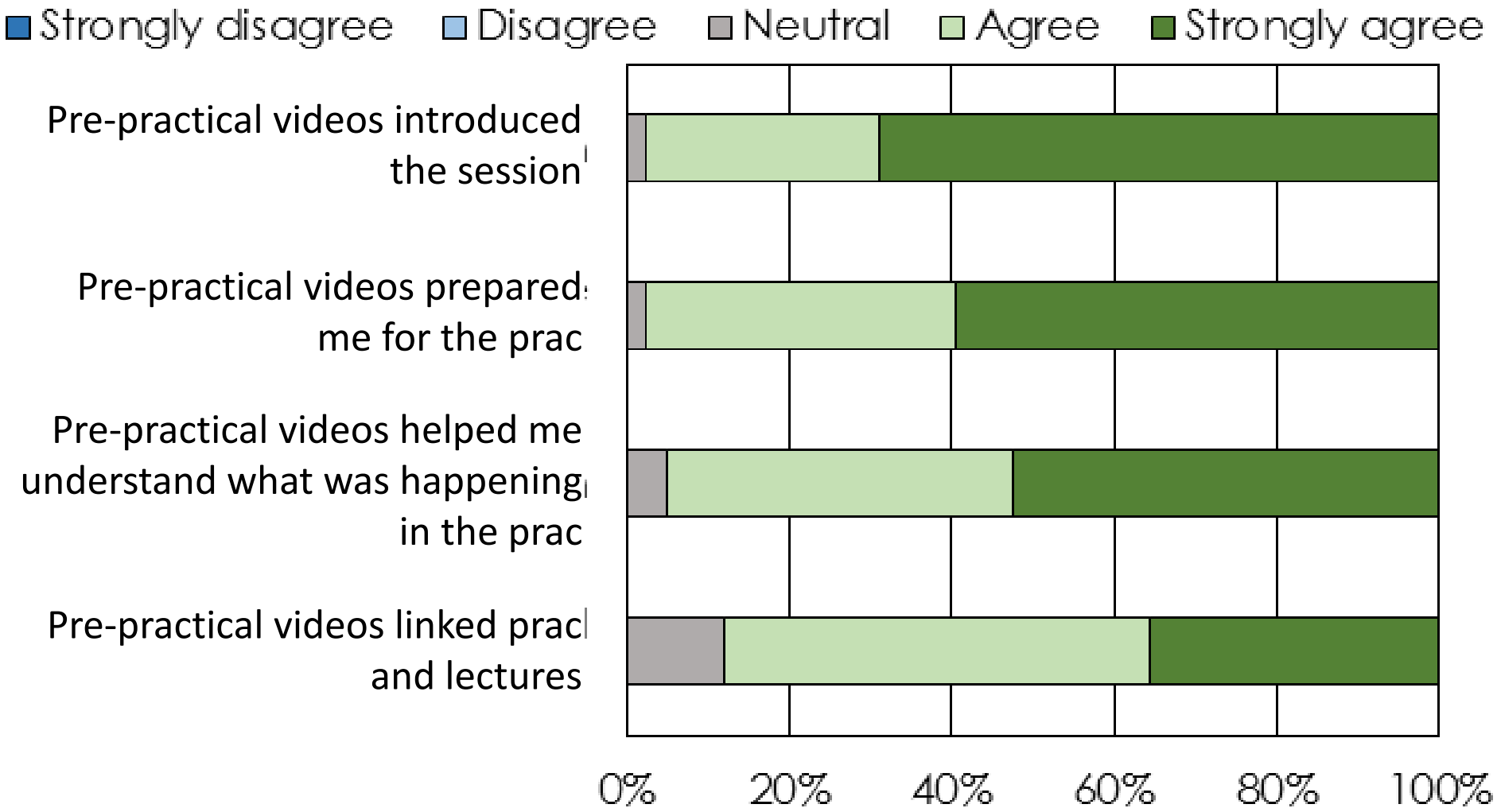
Paper based survey in week 12: 131 responses (89%)



STUDENT FEEDBACK ABOUT PRE-PRAC VIDEOS (2016)

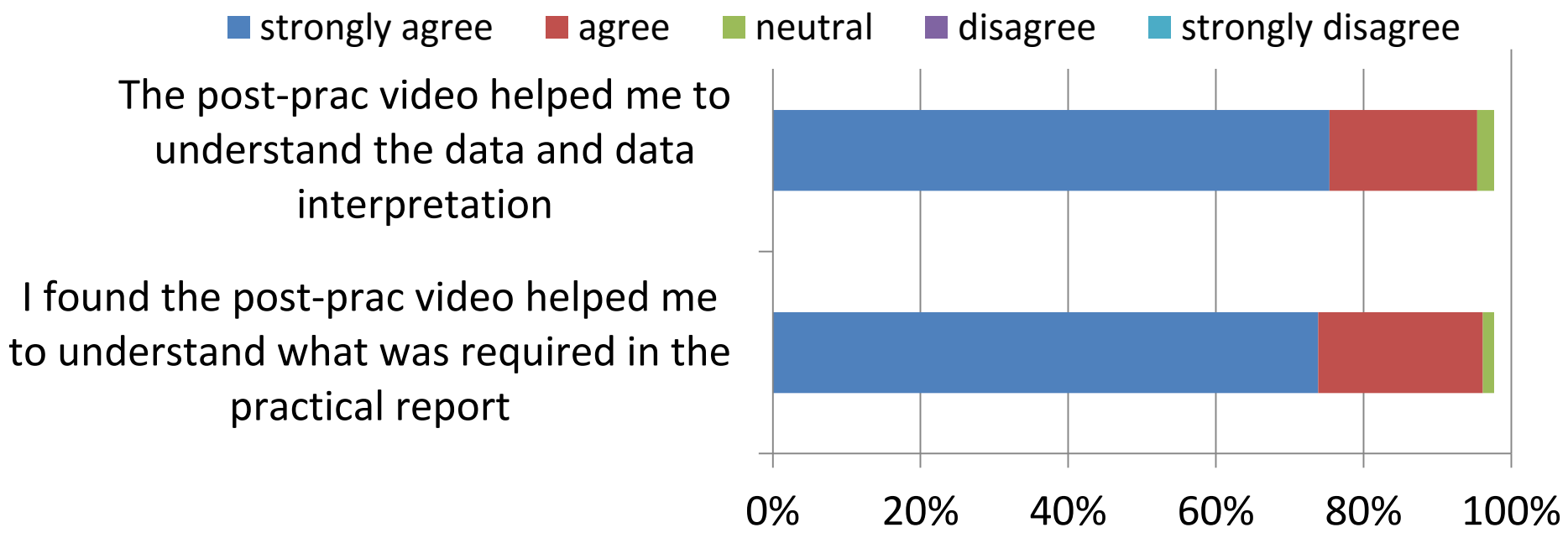
Hortomaris (2016) Honours thesis

Unit: Principles of Drug Action (2016); Responses 24% (42/172)



STUDENT FEEDBACK ABOUT POST-PRAC VIDEOS (2013)

Paper based survey in week 12: 131 responses (89%)

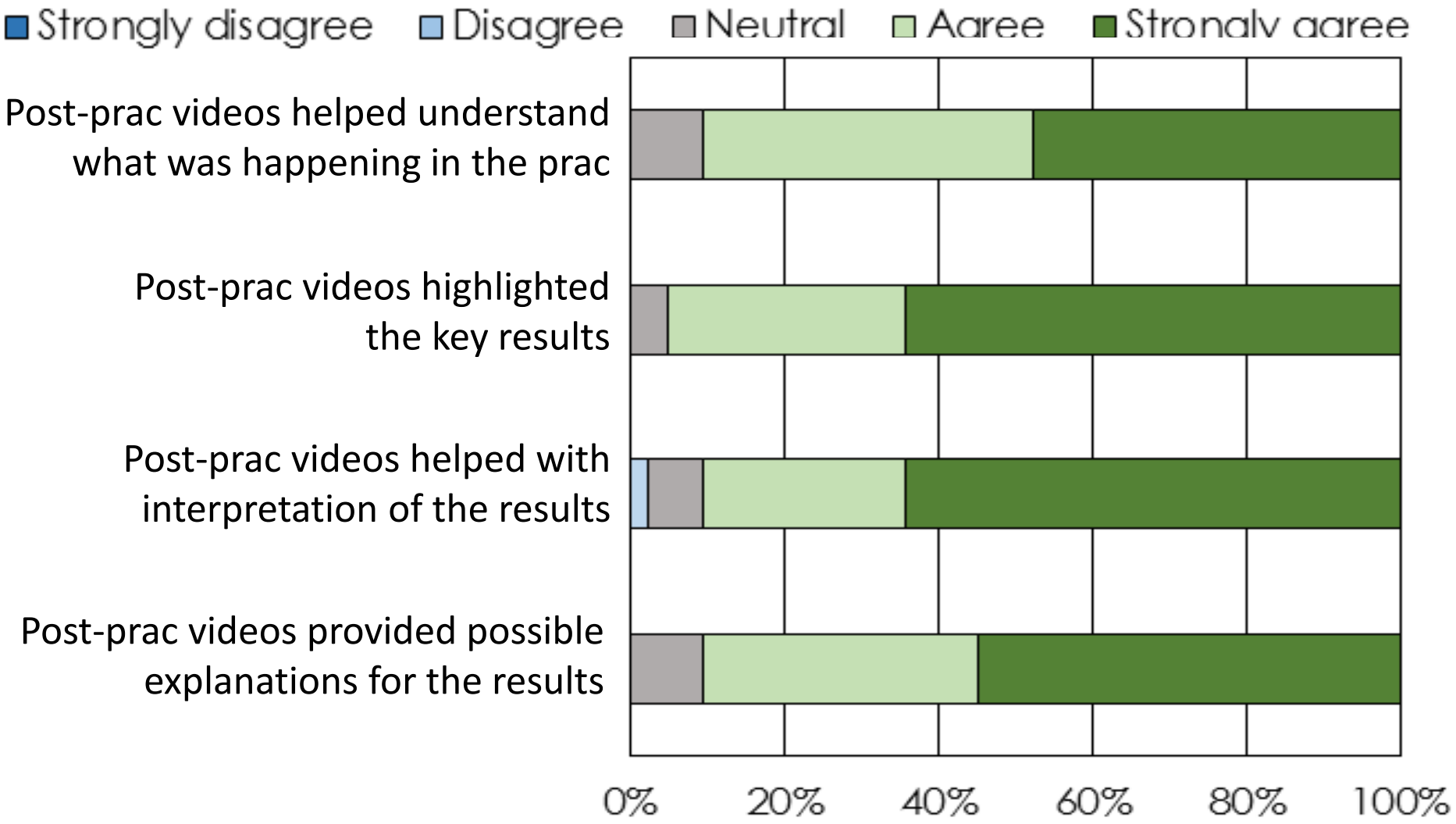


STUDENT ATTITUDES TO POST-PRAC VIDEOS

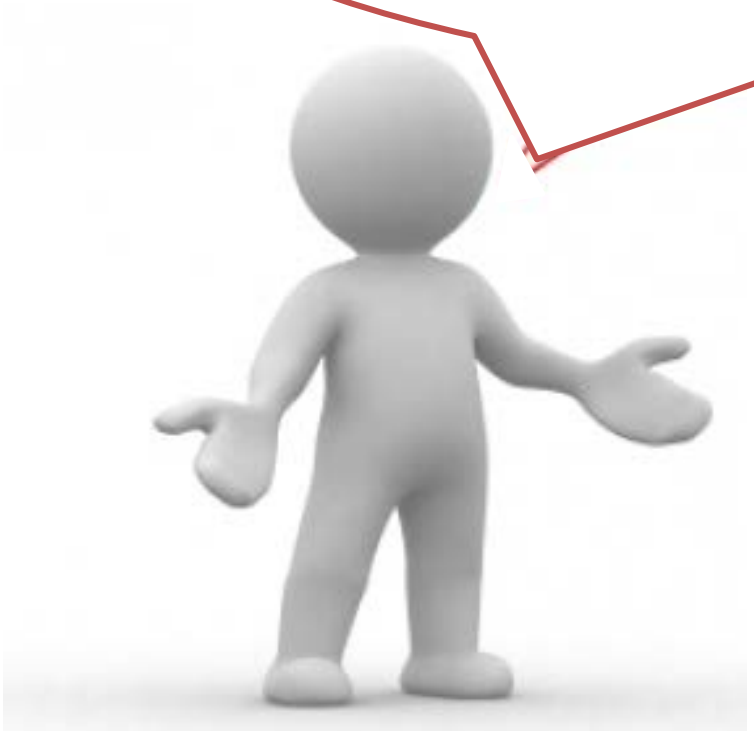
Hortomaris (2016) Honours thesis

MONASH University

Unit: Principles of Drug Action (2016); Responses 24% (42/172)



"I could watch them again if I needed to refresh my memory. Less tedious than reading huge chunks of text when you're tired which was helpful. Visually showing results for pracs was easier to understand than results section in manual."



PHA3011 Student 2013

SUMMARY

- Students attitudes to pre- and post prac videos are generally positive
- Linking them to an assessment task increases the likelihood that they will be used.

e-Learning resources to supplement content delivery

E-LEARNING RESOURCES TO SUPPLEMENT CONTENT DELIVERY

MONASH University

- to contextualise content of the lecture
- provide background information
- to replace face-to-face lectures

POTENTIAL SOURCES OF E-LEARNING RESOURCES

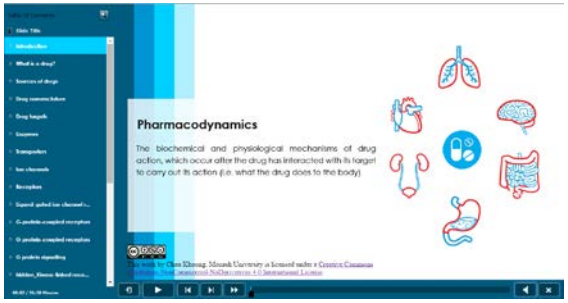
- Pharmacology Education Project
  (http://www.pharmacologyeducation.org/)
- Videos available online:
  - TedTalks (https://www.ted.com/talks)
  - Khan Academy / Osmosis / other YouTube channels
- Create your own…
  - Videos
  - Multimedia resources

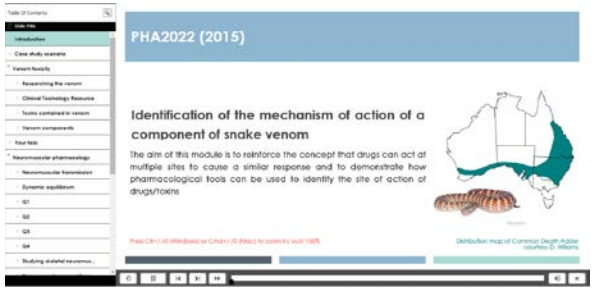
MULTIMEDIA RESOURCES DEVELOPED

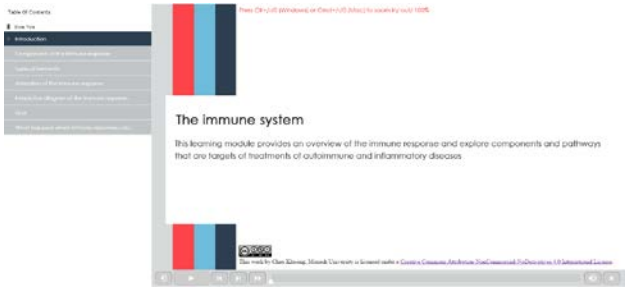
Khuong, 2017 PhD thesis

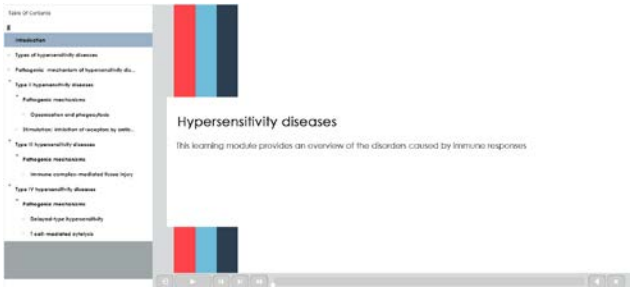
- Neurotransmission
- Neuromuscular pharmacology
- Pharmacodynamics
- Immunology

...AND ORGANISED INTO LEARNING MODULES







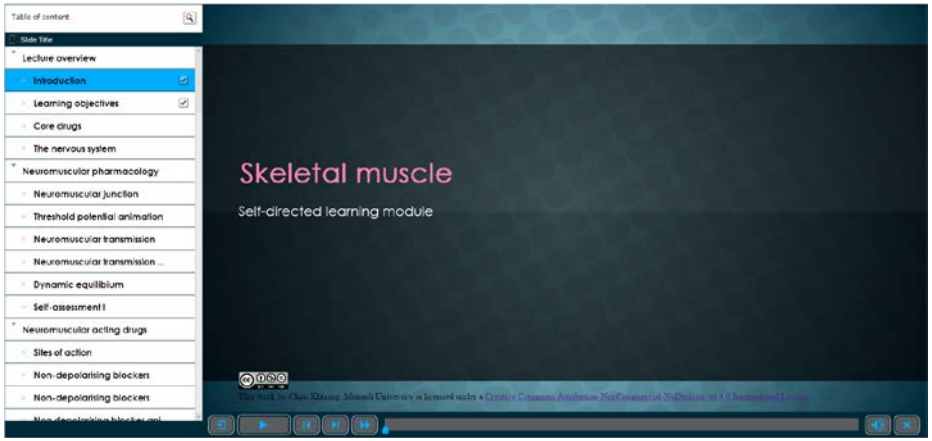


Narrated & include:

- Interactive exercises
- Self assessment quizzes

Khuong, 2017 PhD thesis

INCORPORATING THESE RESOURCES INTO THE TEACHING PROGRAM



From 2015: made available as self-directed learning activities to replace lectures on these topics to Year 1 medical students

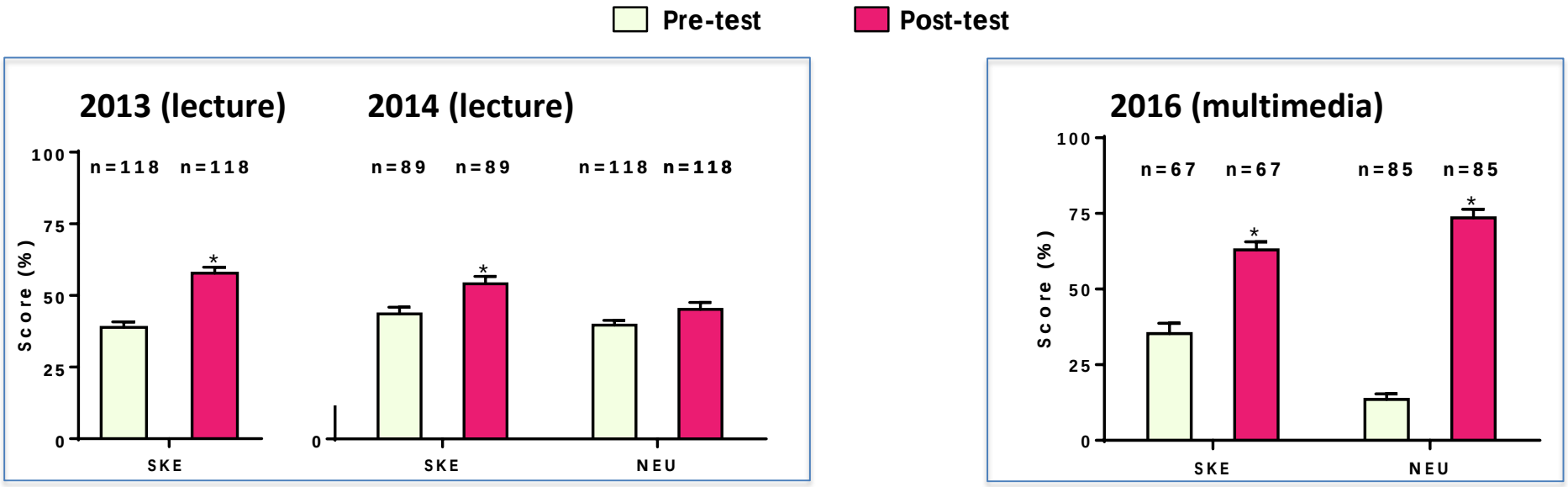
- made available via LMS (Moodle)
- time allocated in timetable for completion

Khuong, 2017 PhD thesis

EVALUATION OF IMPACT OF E-LEARNING RESOURCES ON LEARNING

MONASH University

Pre- and post-test results of MED1011 students who completed the modules vs Pre- and post-test results of MED1011 students who attended the lectures



Data are expressed as mean ± SEM. * $p<0.05$

Data were analysed using a two-way repeated measure ANOVA with a Bonferroni's multiple comparison

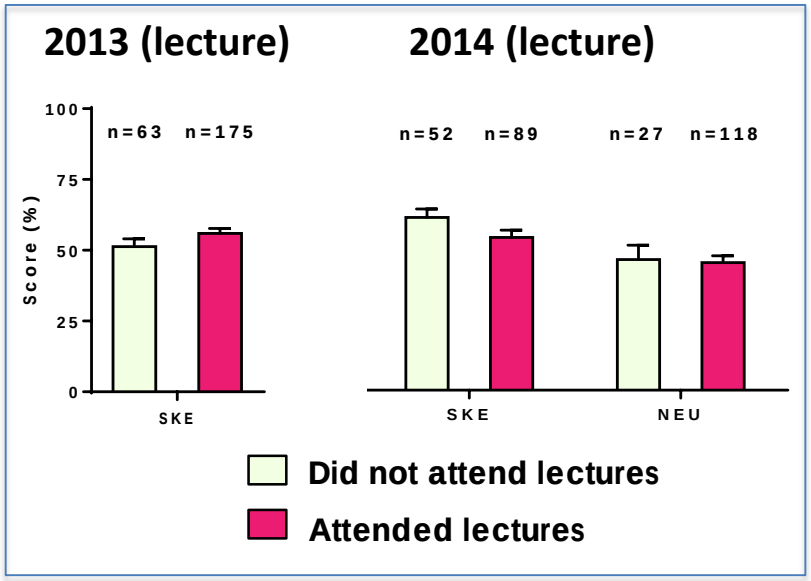
The multimedia resources had a positive effect on test results

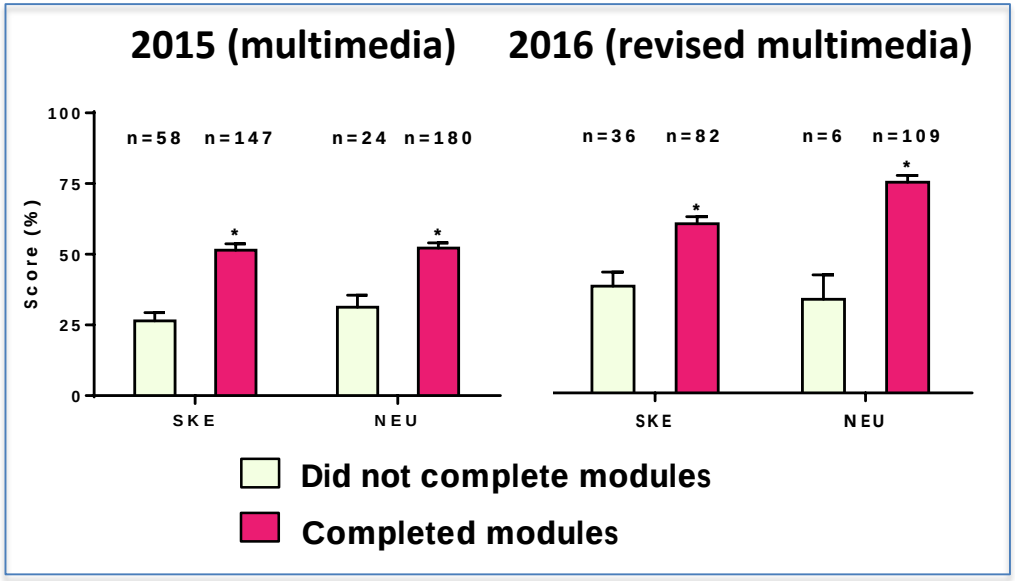
Khuong, 2017 PhD thesis

Post-test results of MED1011 students who completed the modules *cf* those who had not

vs

Post-test results of MED1011 students who attended lectures cf those who had not





Data are expressed as mean ± SEM. * $p<0.05$

Data were analysed using a two-way ANOVA with a Bonferroni's multiple comparison

Not completing the modules had a greater impact on post-test scores than not attending the lectures

Khuong, 2017 PhD thesis

STUDENT FEEDBACK

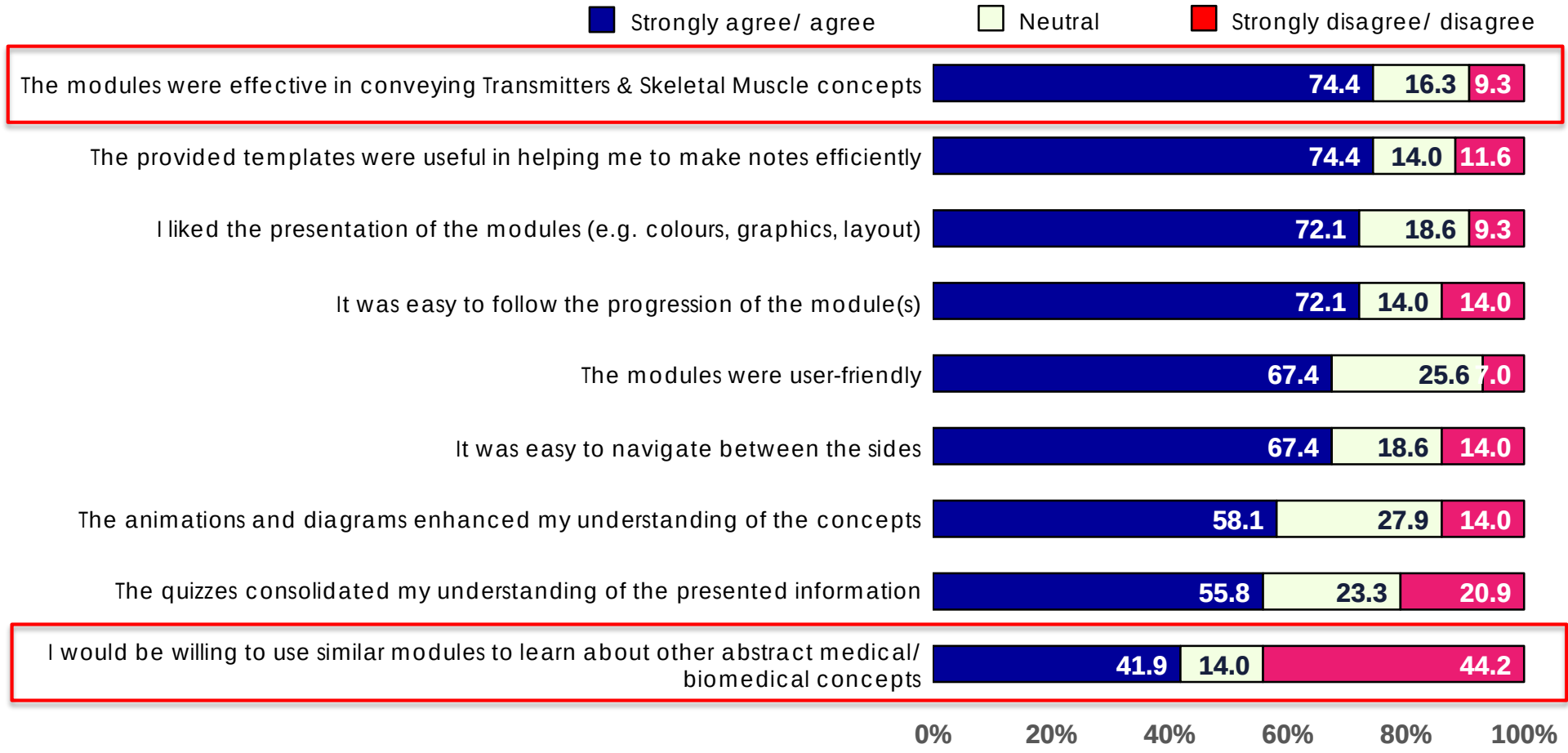
"The modules were very interactive. I got a lot out of the contents… they definitely chose good topics to do online modules. ***When we can see physiological processes happening with the diagrams and animations, it's easier to remember the concepts****… we get to do it at our own pace and time.*

*"****Prefer learning through lectures****…incredibly* ***time-consuming****… the voice over did not match the given template, and we would have to either copy everything down by replaying the slide a few times, or miss out on it…would be much more helpful if we were given* ***written notes*** *to read"*

Khuong, 2017 PhD thesis

MED1011 survey responses, 2016

n= 43 (out of ~300 students)



Khuong, 2017 PhD thesis

SUMMARY

- The developed modules can be used as self-directed learning resources to deliver pharmacology content
- Students' prior learning experience & self-regulated learning efficiency affects their attitude to e-learning

TAKE HOME MESSAGES…

MONASH University

- Finding good quality resources can be time consuming
  - *It helps to identify "go-to" sites such as PEP*
  - *You may need to justify the use of these to students*
- Developing your own resources takes time!
  - *When creating resources, avoid specifics so they can be reused*
- Student uptake is influenced by prior learning experiences
  - *Highlight the relevance of the resource & clearly link to curriculum content*
  - *Students are more likely to complete if they are linked to assessments*
- Better learning performance ≠ Higher learning satisfaction

(Dori YJ et al (2007). J Sci Educ Technol 16(4), 299-323)

TAKE HOME MESSAGES….

- We need to share
  - *resources created and found…*
  - *ideas for incorporating these into our own teaching programs*

ACKNOWLEDGEMENTS

Thanks to:

- ✓ Chau Khuong: *developed & evaluated multimedia modules*
- ✓ Matthew Hortomaris: *undertook student surveys of prac resources*
- ✓ Drs Eva Patak & Jennifer Irvine: *developed e-Pharmacology*
- ✓ Drs Barbara Kemp-Harper: *my post prac co-presenters* & Klaudia Budzyn
- ✓ Students of PHA3011 & MED1011: 2013 - 2017