

Three hour labs: breaking the mould of cookbook science

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Outline

- Background
- Development of new labs
- Evaluation and Implementation
- Further work

Background

- Level One Biology
 - 700 students
 - 5 lectures per week (X3) plus a lab
 - 1/3 of first year curriculum, with Chem, Sci Fund & another course
- Weekly biology labs
 - 14 repeats, in groups of ~50 students
 - 3 hour, discrete labs

More information can be found at (Brown, A., 2007) :
<http://www.bioscience.heacademy.ac.uk/ftp/events/repforum07/brown.pdf>

Background

- Opportunity for development of new labs
 - Relevance
 - Enquiry-based (Kahn & O'Rourke, 2005)
 - Duration more than 3 hours
- Labs for replacement
 - “Malaria”
 - “Immunology”
- New lab
 - “Diagnosis of Infectious Diseases”

Kahn, P. & O'Rourke, K. (2005) *Understanding Enquiry-Based Learning*. All Ireland Society for Higher Education. Available online at: <http://www.aishe.org/readings/2005-2/chapter1.pdf>

Development of new labs

- Funded by UK HEA Centre for Bioscience
 - Research assistant (Spring 2010)
 - Consumables
 - Student volunteers (Summer 2010)
 - Dissemination

Development of new labs

- Research Assistant
 - GTA familiar with Level One Biology course
 - Extensive experience as a technician
- Development of each of the components of the lab
 - Does each component work?
 - Are the substitutes convincing?
 - Introduction of ambiguity

Diagnosis of infectious disease lab overview

- Scenario-based

A group of six Zoology students have recently returned from a field trip to Kenya, where they have been studying the behaviour of mosquitoes. They all feel generally unwell, with some symptoms in common (malaise etc), and some individual symptoms.

Since they had all been exposed to the same risk factors (exposure to mosquitoes, poor sanitation, swimming in local lakes, poor adherence to malaria prophylaxis), doctors have ordered a series of tests to determine if they had contracted an infection. It could be a bacterial, viral or parasitic infection. There is also the possibility of concurrent infections (more than one at the same time), or simply an infection they had contracted since returning home.

The doctors also requested that their ABO blood grouping be determined, in case any of them needed a blood transfusion. You will learn about ABO blood grouping in a short DVD.

You are provided with clinical samples from **ONE** of the patients (indicated by a **patient number**) and, next week you will receive more information about their vaccine history/drug prophylaxis and description of their particular symptoms.

Diagnosis of infectious disease lab overview

- Six patients
- Group of 8 students work in pairs on one patient
- Carry out diagnostic tests
 - ELISA
 - Blood, CSF and stool samples
 - Gram stain
 - Giemsa stain
 - Blood agar
 - TCBS agar
- Medical histories
- Research possible diseases (www.fitfortravel.nhs.uk)
- Reach consensus on (probable) diagnosis

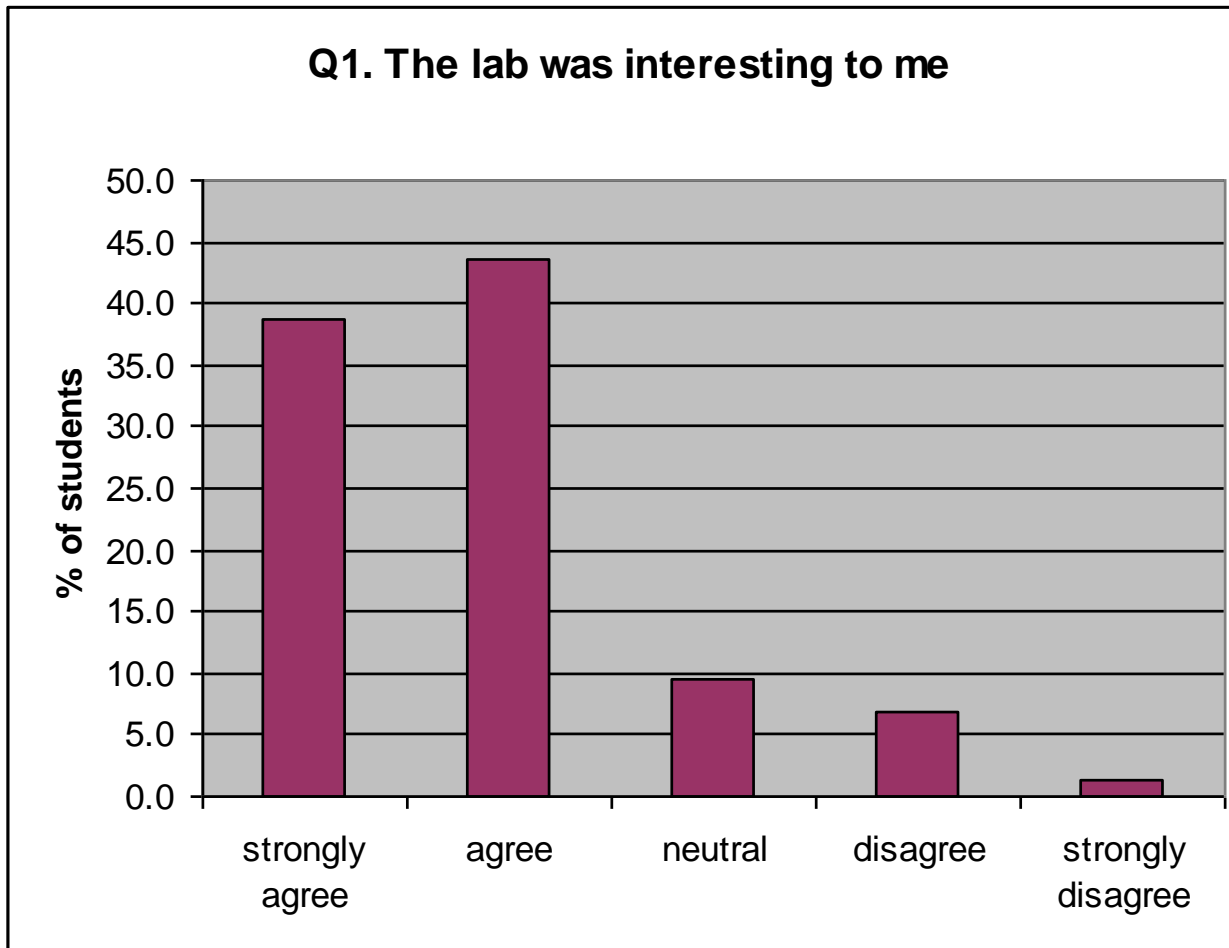
Evaluation and implementation

- Six former Level One Biology students
- Six Level One Biology GTAs
- Two afternoon sessions
 - Performed the lab
 - Took notes
 - Ambiguities
 - Errors
 - Lack of explanation
 - Timing

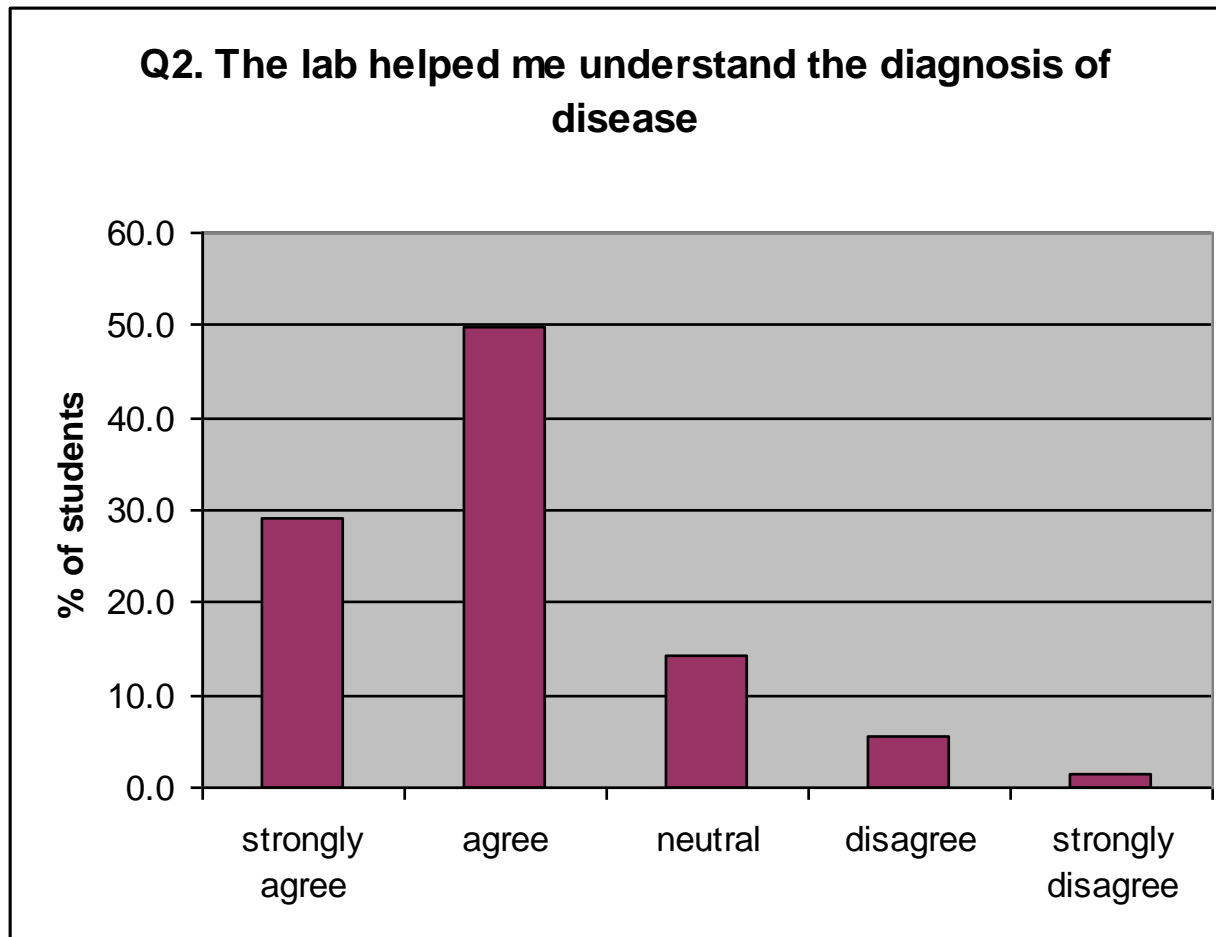
Evaluation and implementation

- Six patients
 - Malaria
 - Dengue
 - Schistosomiasis/Trichuris
 - N. meningiditis
 - Yellow fever
 - Cholera
- Six diagnoses
 - Fever chart (-ve blood film)
 - +ve ELISA
 - Eggs in faecal sample
 - +ve blood/CSF plates (-ve ELISA)
 - +ve ELISA
 - +ve TCBS plates

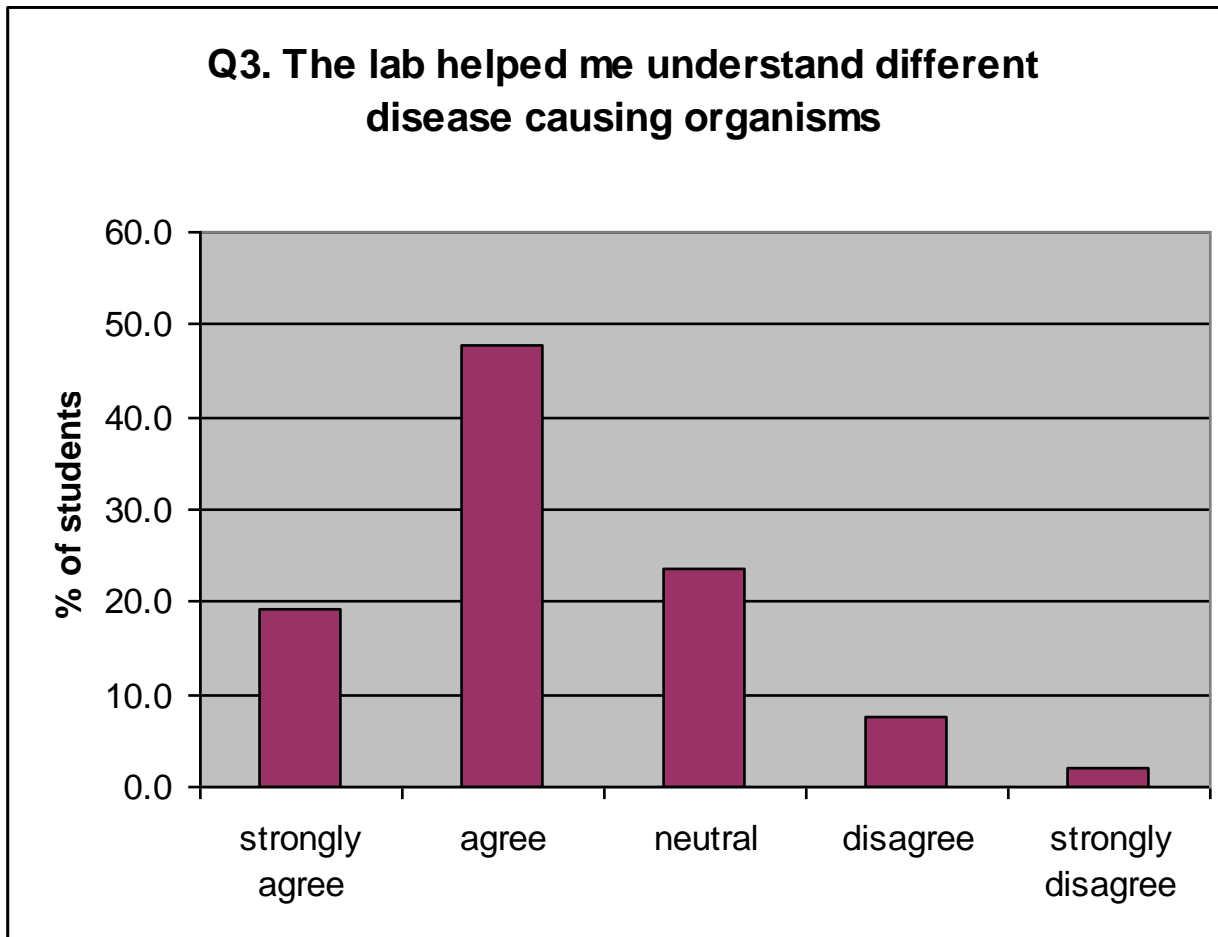
Feedback from students



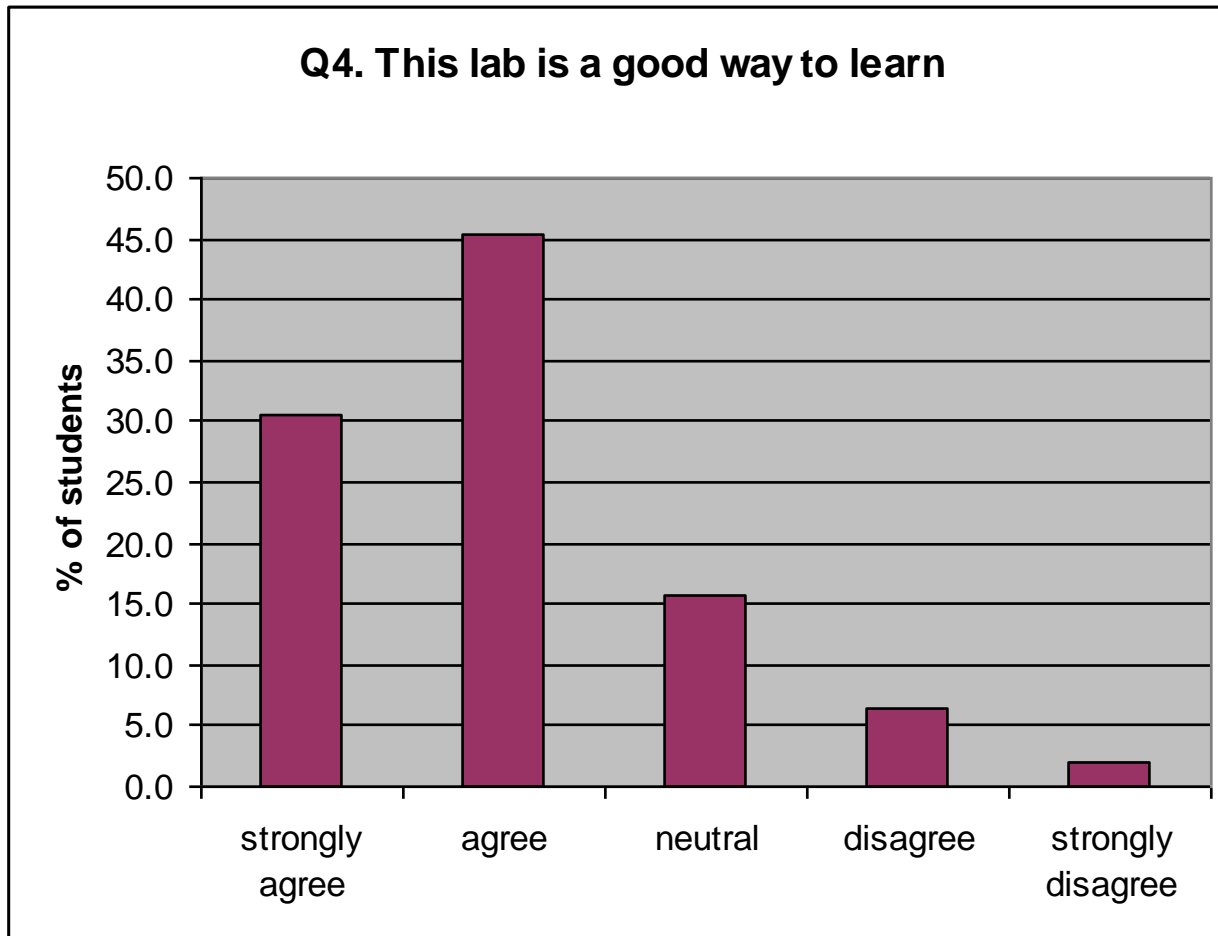
Feedback from students



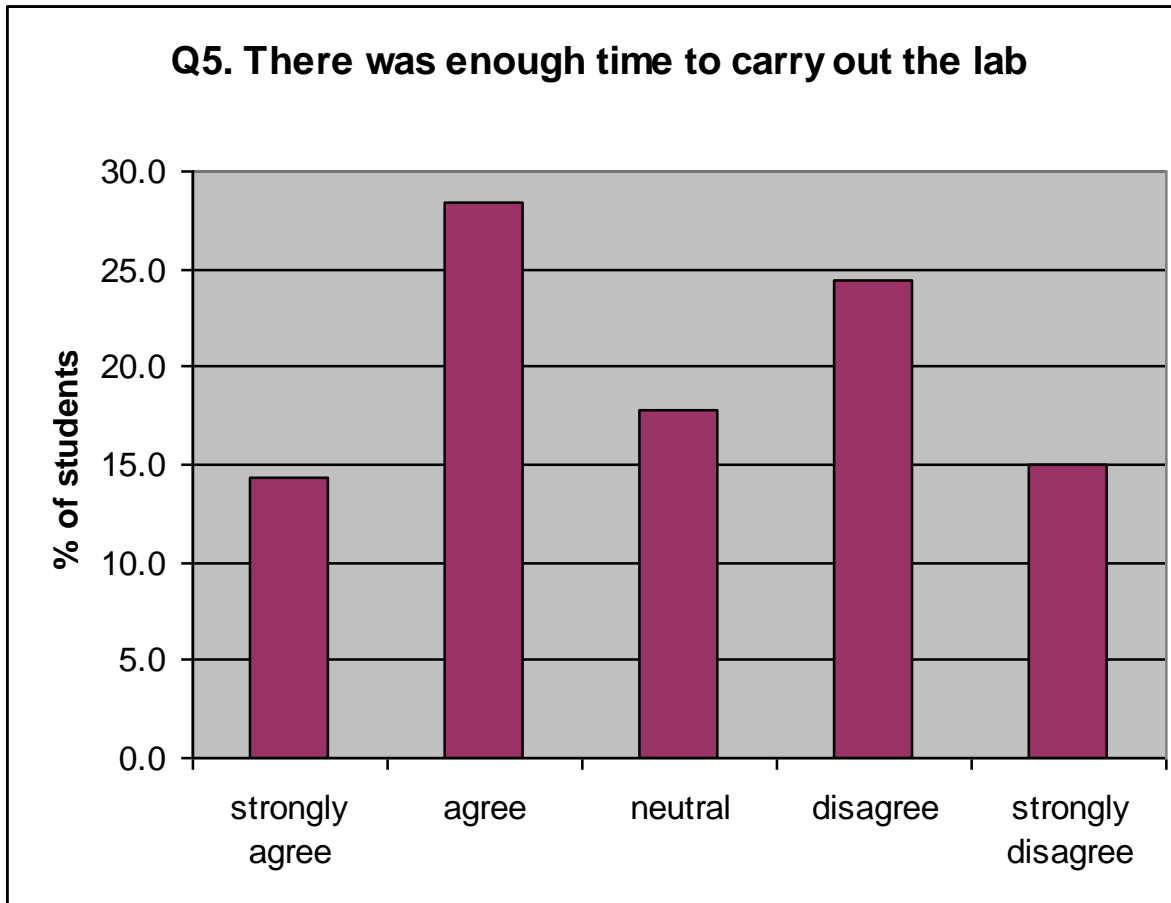
Feedback from students



Feedback from students



Feedback from students



Feedback from students

Top 7 comments	number
More time needed	44
Interesting	11
Confusing	6
Fun/good	5
More explanation	5
Enjoyable	3
More help from demonstrators	2

Student comments

“A very nice lab. The 1st part was a bit confusing, but during the 2nd part, things started to unfold...😊”

“It felt horribly rushed, especially the second one but some of it was also caused by factors out of any control. But it was really, really, interesting, as I’ve never done anything like it. I felt like I learned a lot! ❤️”

“Would have preferred more time to research and analyse results – there wasn’t enough time to do this when we’d finished.”

Further work

- Further development - undergraduates
 - Timing
 - Independent research
 - Sterile technique
- Offered as part of postgraduate diploma in tropical medicine
 - No issues with timing
 - Better grasp of diseases involved
 - Appreciation of work involved in diagnostics