



Brunel
University
London

Interdisciplinary education – TBL as a tool to empower students to read academic papers that span multiple disciplines

Pascale Kippelen
David Tree



Cell Biology



Physiology
Biomechanics

Life Sciences BSc



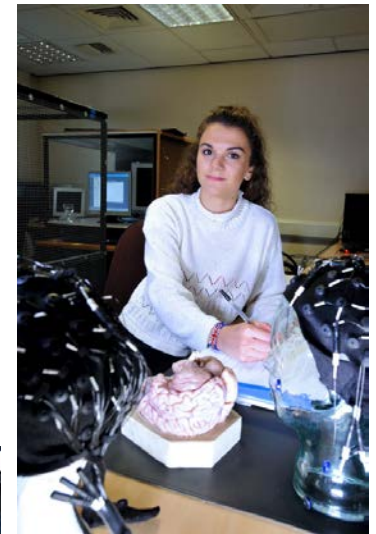
Biochemistry



Quantitative Analysis



Ecology



Psychology



Cell Biology

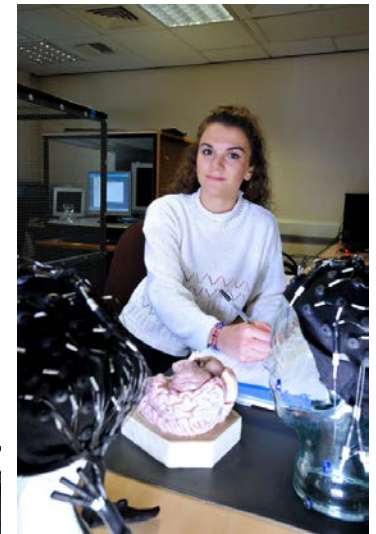


Physiology
Biomechanics

Interdisciplinary Links



Biochemistry



Psychology



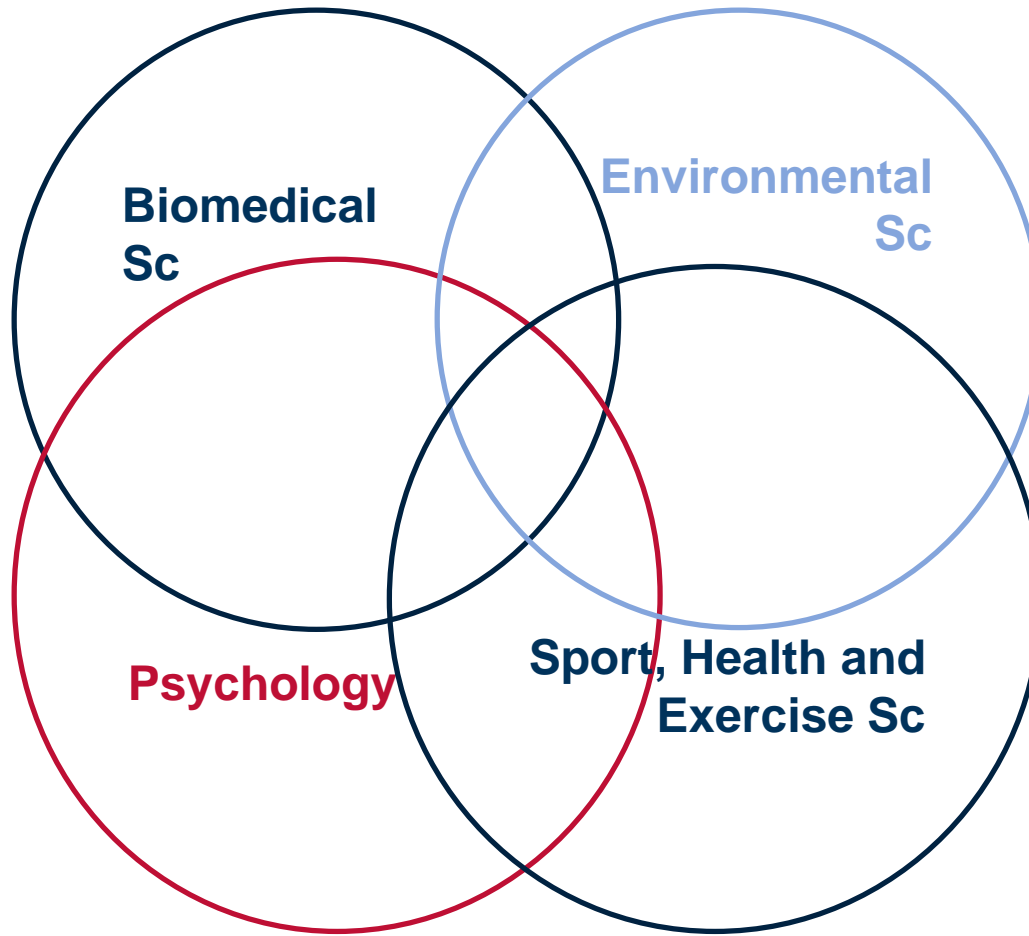
Quantitative Analysis



Ecology

Life Sciences BSc

Degree Programmes in Life Sciences Dept





Life Sciences BSc

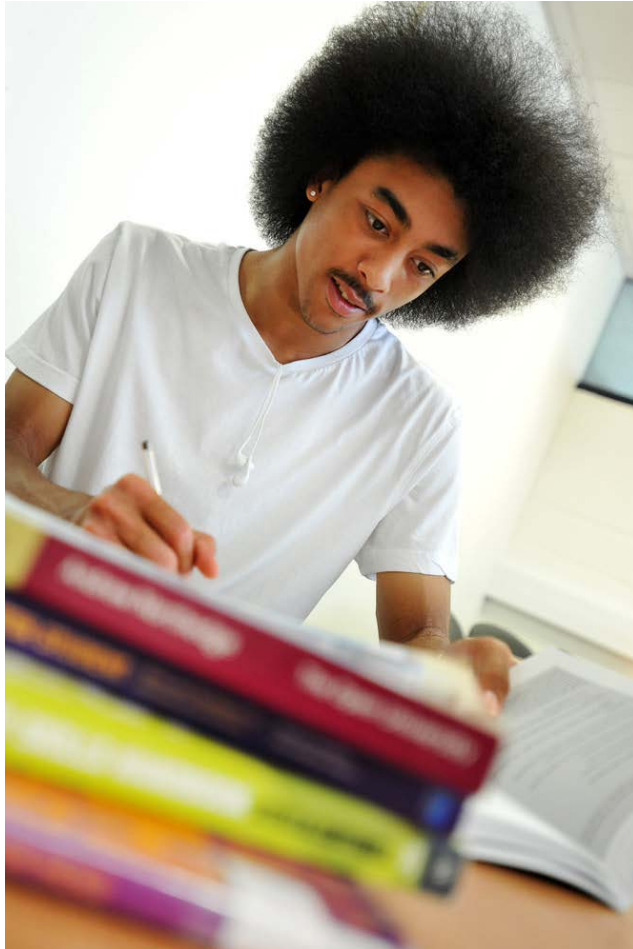
Student Choose 2 Interdisciplinary Specialities

- **Biomedical Sciences BSc**
 - Biochemistry
 - Cell Biology
 - Genetics
 - Infection and Immunity
- **Environmental Sciences BSc**
 - Environmental Health
- **Psychology BSc**
 - Cognitive Neuroscience
 - Evolution and Behaviour
- **Computer Sciences BSc**
 - Computational Data Analytics
- **Sports Sciences BSc**
 - Sport, Health and Exercise

Interdisciplinary approaches are necessary to develop the graduate attributes needed!

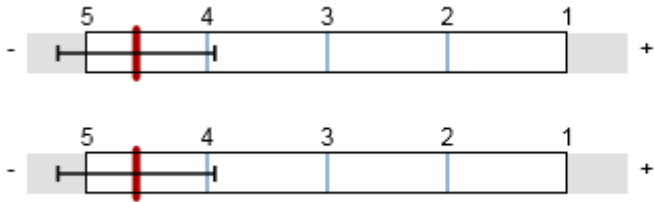


Student attitudes to reading papers



The Outcome – Student Feedback

3. Teaching on this module / study block



av.=4.6
dev.=0.7

av.=4.6
dev.=0.7

- What were the most enjoyable aspects of this study block?

'Finding out and understanding that reading scientist article is not as difficult as it seems to be'

Synoptic Assessment in Life Sciences 1: Teamwork and Presentation

- Teach them to see the interdisciplinary links between different areas of study
- Teach them to read papers from the first week of the first year of their degree
- Underline the importance of statistical analysis in all areas
- Learn to carefully read and summarise
- Understand what academics do!

A paper we read



INTERDISCIPLINARY


The diagram consists of two rectangular boxes. The box on the left is light blue and contains the word 'INTERDISCIPLINARY' in white capital letters. The box on the right is dark blue and contains the word 'TOPICAL' in white capital letters. A thin blue line starts from the bottom-left corner of the 'INTERDISCIPLINARY' box, extends horizontally to the right, and then turns vertically upwards to end at the top-left corner of the 'TOPICAL' box.

TOPICAL

J Appl Physiol 120: 1011–1017, 2016.

First published February 4, 2016; doi:10.1152/japplphysiol.00700.2015.

A standard, single dose of inhaled terbutaline attenuates hyperpnea-induced bronchoconstriction and mast cell activation in athletes

A. J. Simpson,¹ J. R. Bood,^{2,3,4} S. D. Anderson,⁵ L. M. Romer,¹ B. Dahlén,^{3,4} S.-E. Dahlén,^{2,4}
and  P. Kippelen¹

¹Centre for Human Performance, Exercise and Rehabilitation, College of Health and Life Sciences, Brunel University London, United Kingdom; ²Unit for Experimental Asthma Research, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden; ³Unit for Clinical Asthma Research, Department of Internal Medicine, Karolinska University Hospital Huddinge, Stockholm, Sweden; ⁴Centre for Allergy Research, Karolinska Institutet, Stockholm, Sweden; and ⁵Department of Respiratory and Sleep Medicine, Royal Prince Alfred Hospital, Sydney, Australia

Submitted 19 August 2015; accepted in final form 28 January 2016



RELEVANT

The diagram consists of two rectangular boxes. The box on the left is dark blue and contains the word 'RELEVANT' in white capital letters. The box on the right is red and contains the words 'SOUNDS COMPLICATED' in white capital letters. A thin red line starts from the top-left corner of the 'RELEVANT' box, extends horizontally to the right, and then turns vertically upwards to end at the top-left corner of the 'SOUNDS COMPLICATED' box.

SOUNDS
COMPLICATED

Pre-Teaching Activities



THE CONVERSATION

Academic rigour, journalistic flair

Arts + Culture Business + Economy Cities Education Environment + Energy **Health + Medicine** Politics + Society

Terbutaline: the drug at the heart of British Cycling's week from hell

April 29, 2016 3.24pm BST



Pre-Teaching Activities



Individual Readiness Assessment Test

- Online MCQ so that they learn what all the difficult terms and concepts mean before they start reading
- Learn better finding it out for themselves than being told

Individual Readiness Assessment Test

2. Which is the best definition of hyperpnea?

- A. Hyperpnea is decreased depth and rate of breathing and can be either physiologic or pathologic.
- B. Hyperpnea is random fluctuation in the depth and rate of breathing and can be either physiologic or pathologic.
- C. Hyperpnea is increased depth and rate of breathing and can be either physiologic or pathologic.
- D. Hyperpnea is an unvarying depth and rate of breathing and can be either physiologic or pathologic.

Individual Readiness Assessment Test

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D. Hyperpnea is an unvarying depth and rate of breathing and can be either physiologic or pathologic.

Team Based Learning – 3 Hours



Team Readiness Assessment Test


- First they do the test again as a team
- We all start the session focussed and understanding the key terms and concepts

Deciphering the Title!

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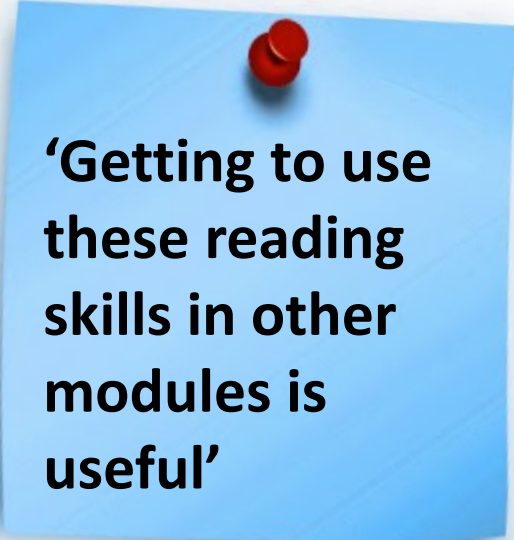
¹*Centre for Human Performance, Exercise and Rehabilitation, College of Health and Life Sciences, Brunel University London, United Kingdom;* ²*Unit for Experimental Asthma Research, Institute of Environmental Medicine, Karolinska Institutet, Stockholm, Sweden;* ³*Unit for Clinical Asthma Research, Department of Internal Medicine, Karolinska University Hospital Huddinge, Stockholm, Sweden;* ⁴*Centre for Allergy Research, Karolinska Institutet, Stockholm, Sweden; and* ⁵*Department of Respiratory and Sleep Medicine, Royal Prince Alfred Hospital, Sydney, Australia*

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Reading Individually and Together

- Read a paragraph individually
- Discuss as a group
- Write a summary of the paragraph
- Work through the introduction
- End up with a 3-4 sentence summary!

Student comment:

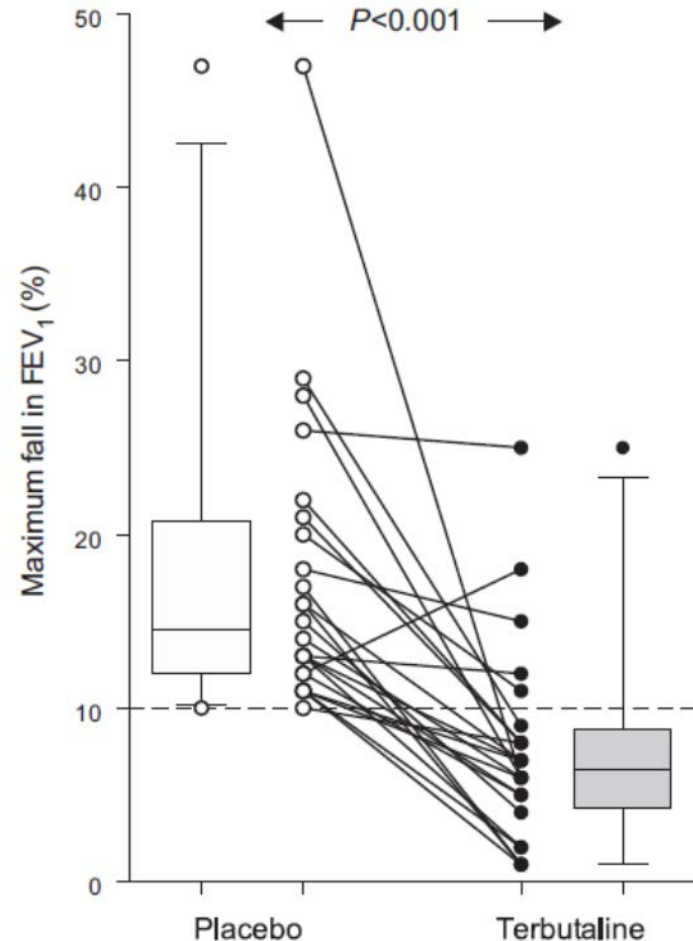


'Getting to use these reading skills in other modules is useful'

Teaching Reading Strategies



- Read results by understanding figures
- Work through paper and summarise
- End up with a self-written abstract of paper



Explore Reading Strategies



RESEARCH ARTICLE

Perceptions of scientific research literature and strategies for reading papers depend on academic career stage

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Explore Reading Strategies

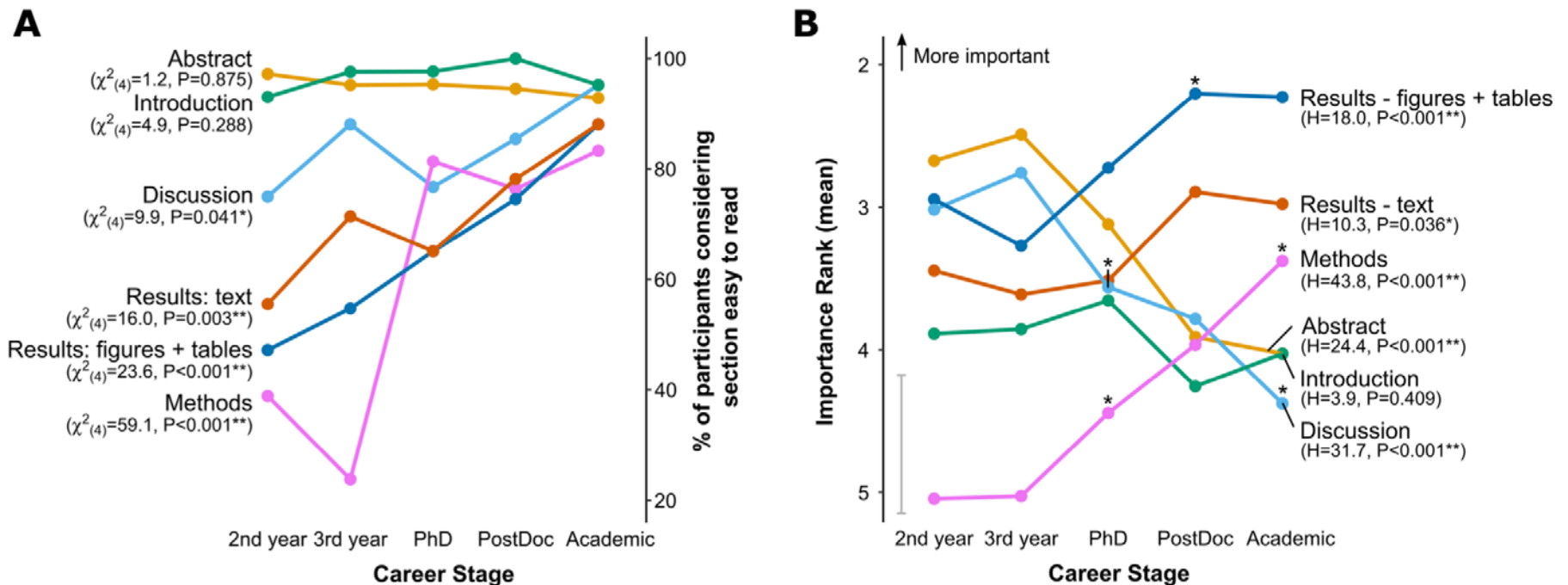


Fig 2. Different sections of scientific papers are considered easy to read and important at different stages of academic careers. A: The proportion of participants considering a section easy to read (presented as 'Somewhat easy', 'easy' 'very easy' combined) as a function of career stage. Results of Chi-square tests are indicated on the left hand side. B: The mean importance rank of sections as a function of career stage. Error bars are omitted from individual points for clarity, with the sole error bar in grey representing the largest 95% confidence interval for any of the data points. Asterisks above data points indicate significant differences in response compared with the previous career stage as determined by Mann-Whitney post-hoc tests.

Appreciate Interdisciplinarity

Quantitative Data Analysis

Physiology

Anatomy

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Experimental Design

Biochemistry

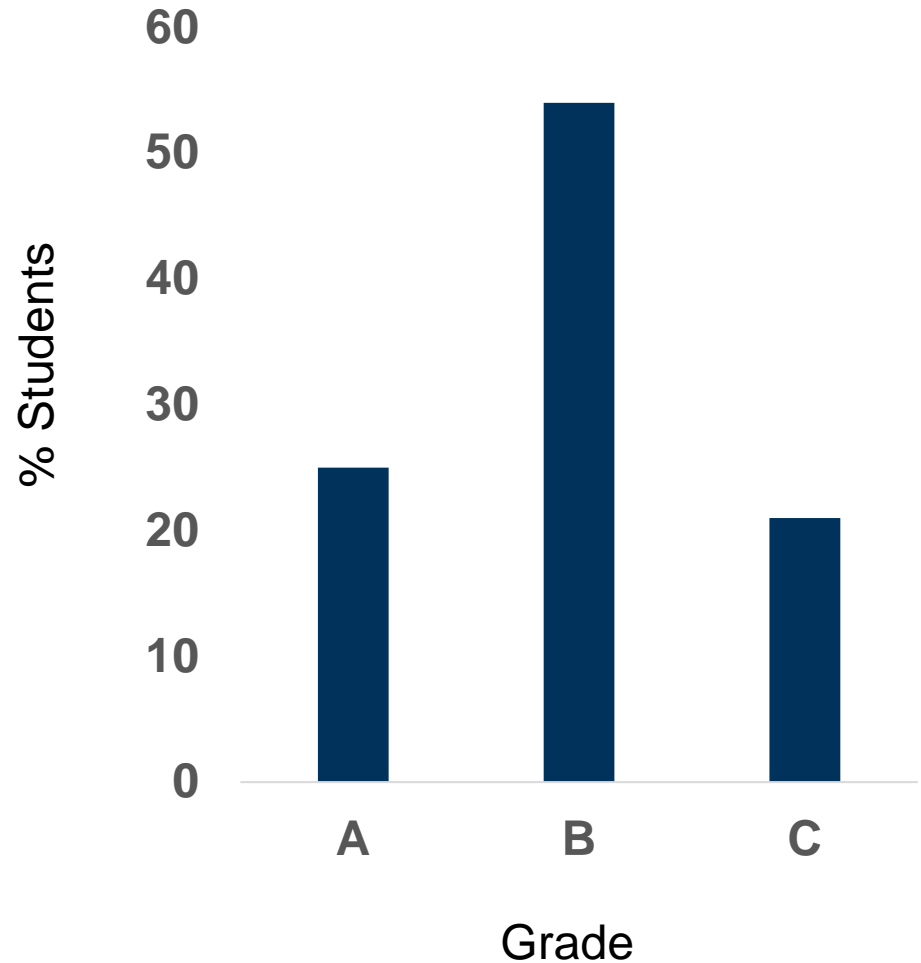
Inflammation: Immunity
and Cell Biology

Assessment - Threshold

- After reading 5 papers students were confident approaching academic literature
- Groups picked one paper and presented a 15 minute talk based on it
- Everyone did it and passed

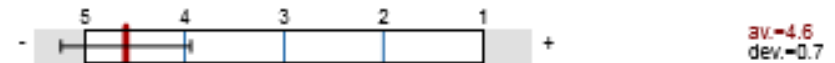
Assessment - Summative

- Students given 12 manuscripts (from BioArchive) with no title or abstract
- Individuals wrote a 500 word abstract describing it

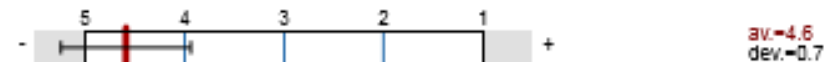


Student Evaluation

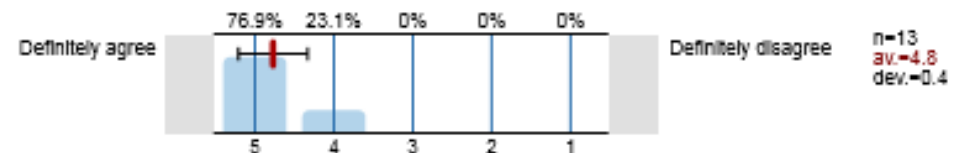
Global Index



3. Teaching on this module / study block



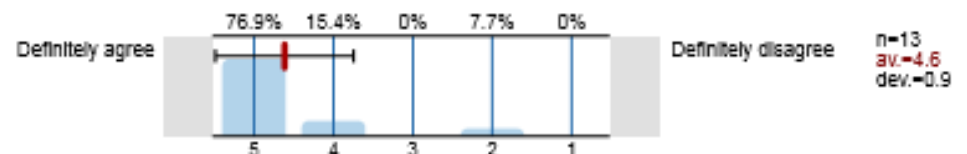
2.5) I have had the right opportunities to work with other students as part of this module / study block



3.1) Staff are good at explaining things



3.2) In teaching sessions, staff interact well with students



4.1) Overall, I am satisfied with the quality of the module / study block



What overall suggestions would you give for improving this study block

- It can be rather taxing to work continuously for three hours on a difficult academic paper, so a short break halfway through the session would be appreciated.
- I would make it 2 hours because this module was the longest. Other than that, everything was perfect, but a little bit demanding with the amount of hours.
- I think for some of the sessions we had they didn't need to be 3 hours long!
- To be shown structure of how to write abstract
- **Nothing needs be improved**

What were the most positive, helpful or enjoyable aspects of this study block?

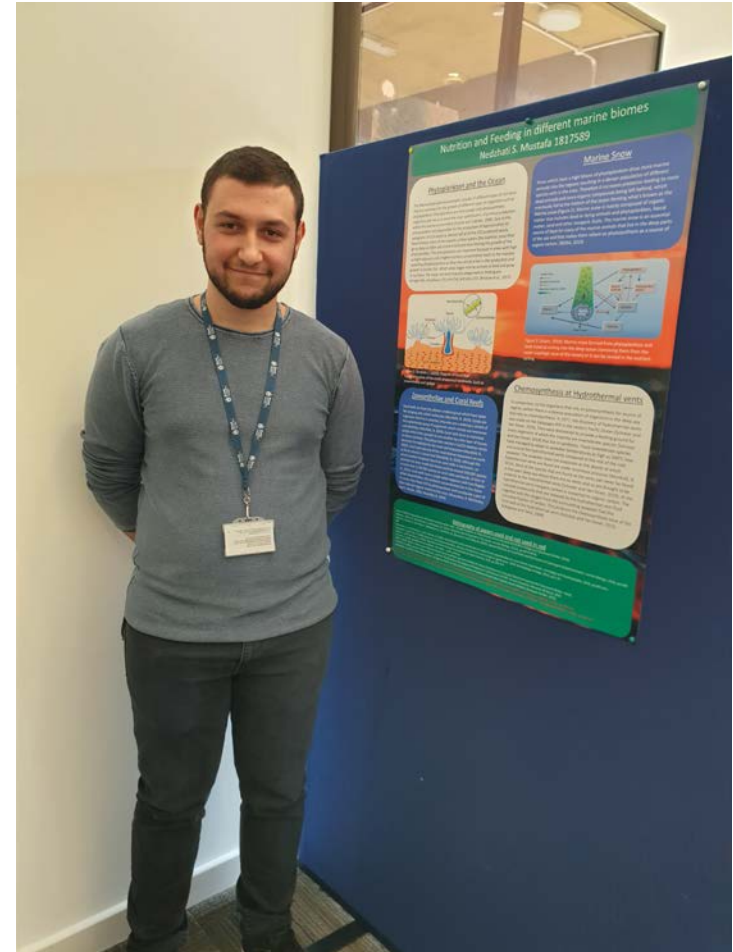
- **Test and web links** provided before the lecture help a lot to understand what the articles will be about.
- **Team work** was very enjoyable and the standard of teaching were high.
- Getting to know and work with different people.
- Working in groups, I definitely spoke to people that I wouldn't have necessarily made friends with. I liked it when the author of the article came to speak to us, it made me understand it more.
- Finding out and understanding that **reading scientist article is not as difficult as it seems to be**. Also getting to use this reading skills in other relevant modules is useful.
- The papers that we've got to read - they were very interested and well structured. Also, in the sessions we had the opportunity to interact with the people who've actually written the papers which was utterly amazing.

Conclusions

- First year undergraduates can read and understand a scientific paper on complex interdisciplinary themes...
-but only if you provide the right context and support
- Student feedback mostly positive, but doesn't really mention interdisciplinary; so we have work to do!
- Subsequent years, synoptic assessments will build on interdisciplinary study and paper reading
- “Meet the authors” a good way to engage students in reading and learning

A Post-Script

- For Biosphere Students had to make a poster from 5 papers
- They did great!
- “The poster assessment was interesting and was helpful in a way that we could practice the skills we had learnt from the teamwork and presentation lectures.”



Thank You

- Fotios Drenos
- Amanda Harvey
- Michael Price