

Enhancing engagement with physiology using infographic presentations.

Derek A. Scott & Alison M. Jenkinson

Europhysiology 2018

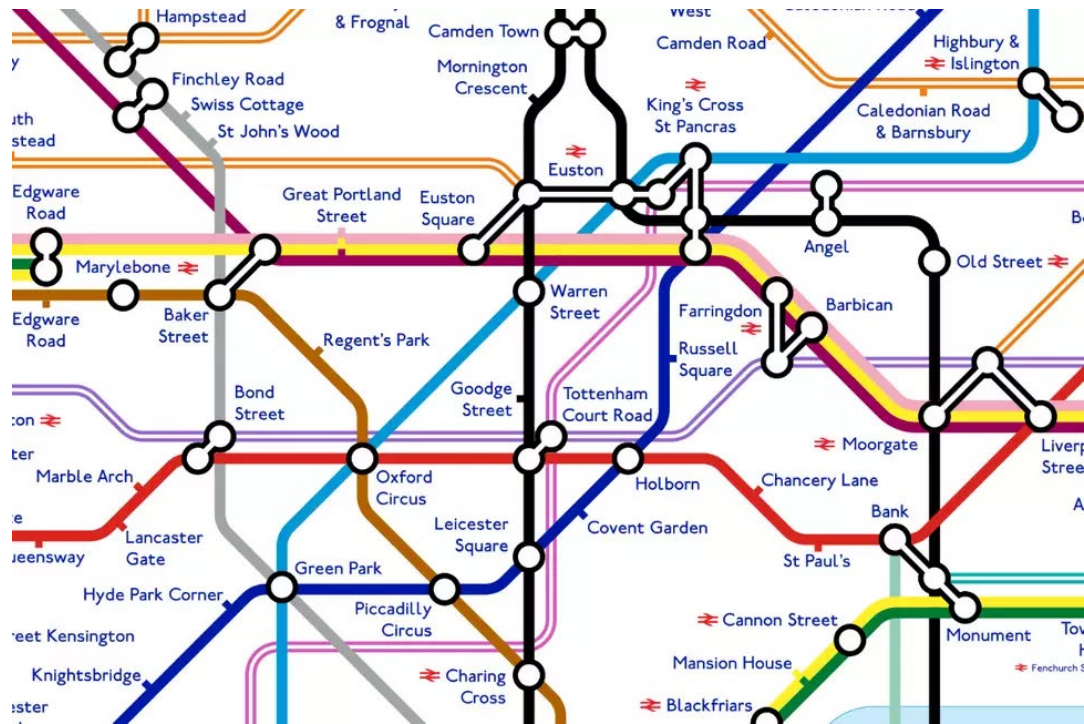


Background

- Poster presentations to communicate scientific knowledge/understanding are a commonly used assessment tool within undergraduate programmes.
- A challenge for students to deliver clear and detailed information whilst minimising volume of text on the poster.
- We sometimes found that this format didn't encourage imaginative project topics or posters.
- To enhance communication skills, imagination and student engagement we adapted an existing physiology literature research project assessment and increased the emphasis on public communication skills with the use of infographics.

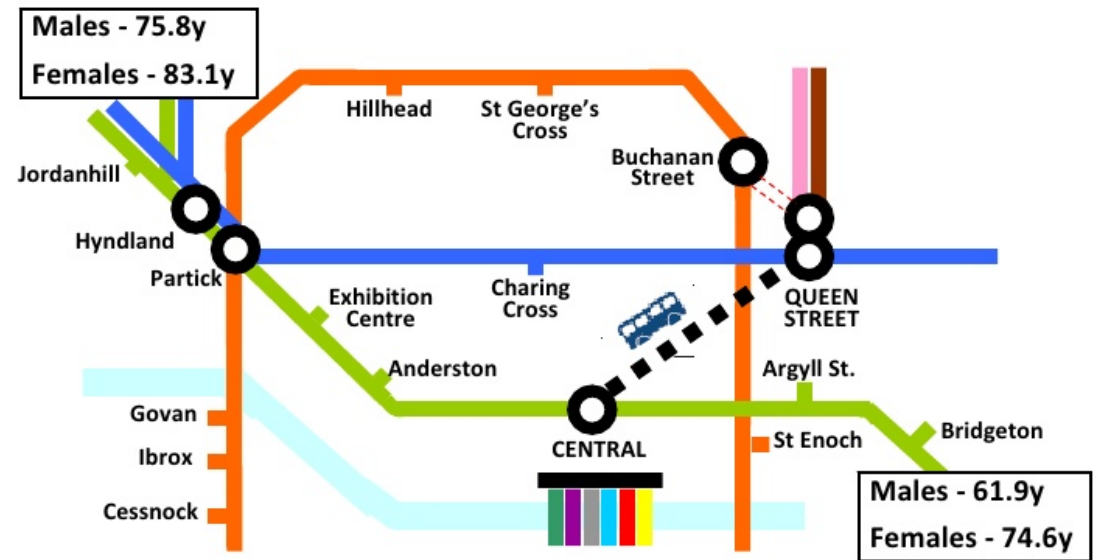
What is an infographic?

- You already know about some famous examples that convey complex information to broad audiences.....



London Underground Map

Each stop on the Argyll line travelling East represents a drop of 1.7 years in male life expectancy



Life expectancy data refers to 2001-5 and was extracted from the GCPH community health and well-being profiles. Adapted from the SPT travel map by Gerry McCartney.

Health Inequality in Glasgow

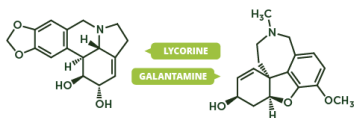
Compound Interest

<https://www.compoundchem.com/infographics/>

SNOWDROPS, ALZHEIMER'S, & CHEMICAL WARFARE

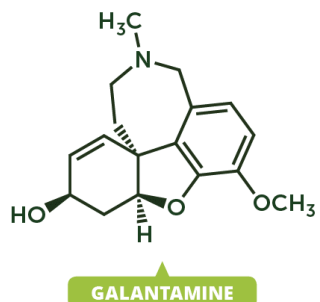
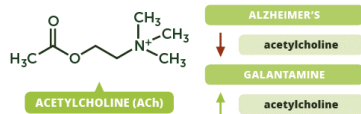
POISONOUS SNOWDROPS

Snowdrops contain poisonous alkaloids, including galantamine and lycorine, particularly in their bulbs. Ingestion can cause vomiting and diarrhoea.



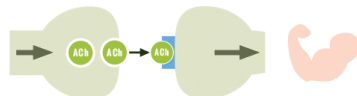
TREATING ALZHEIMER'S

Falling levels of the neurotransmitter acetylcholine are linked to symptoms of Alzheimer's disease. Galantamine stops an enzyme (acetylcholinesterase) breaking down acetylcholine, increasing availability.

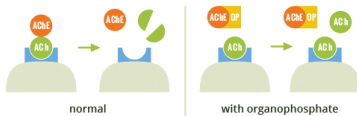


NERVE AGENT POISONING

Acetylcholine (ACh) is released by nerve endings, and controls contraction of muscles when it binds to receptors.



The enzyme acetylcholinesterase (AChE) controls ACh levels by breaking it down. Organophosphate (OP) nerve agents stop this, causing convulsions and death.



Galantamine also latches on to AChE and stops it working, but does so reversibly. This blocks the nerve agents from binding to it irreversibly and prevents poisoning.

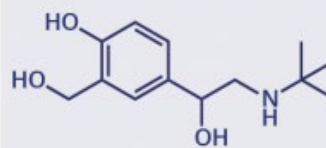
© Andy Brunning/Compound Interest 2018 - www.compoundchem.com | Twitter: @compoundchem | FB: www.facebook.com/compoundchem



THE CHEMISTRY OF ASTHMA INHALERS

Asthma medication commonly comes in two different colours of inhalers: blue and brown. Though these colours can vary, usually the medication can be classed as either a 'reliever' or a 'preventer'. The identity and function of the chemical compounds in each vary.

RELIEVERS



SALBUTAMOL

(also known as albuterol in the US)



Bronchodilator



Short-acting



TWO HOURS

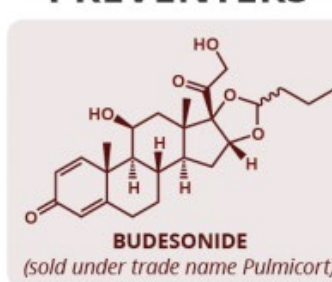


5-20 MINS

Maximal Effect

Relievers, such as salbutamol, are taken for the immediate relief of asthma symptoms. They cause the airways to widen by relaxing the muscles in the lungs. Usually, they are taken 'nebulised' - that is, turned into a fine mist that is then inhaled - and their action is apparent after a short amount of time, making them of great use in cases of asthma attacks. Salbutamol is commonly marketed as Ventolin.

PREVENTERS



BUDESONIDE

(sold under trade name Pulmicort)



Anti-inflammatory



Long-acting



2-8 DAYS

Onset of Action



4-6 WEEKS

For Peak Effect

Preventers help asthma sufferers by acting to reduce inflammation and keep their airways open. They are commonly steroids, and are only useful for prevention - they won't provide any relief if you are already experiencing an asthma attack. It has to be taken daily, and its full effects are not reached for several weeks. Though there are several different drugs used as preventers, they all function similarly.



© COMPOUND INTEREST 2014 - WWW.COMPOUNDCHEM.COM | TWITTER: @COMPOUNDCHEM | FACEBOOK.COM/COMPOUNDCHEM
ASTHMA INHALER IMAGE: Stuart B, <https://www.flickr.com/photos/gnu2000/5602664050>



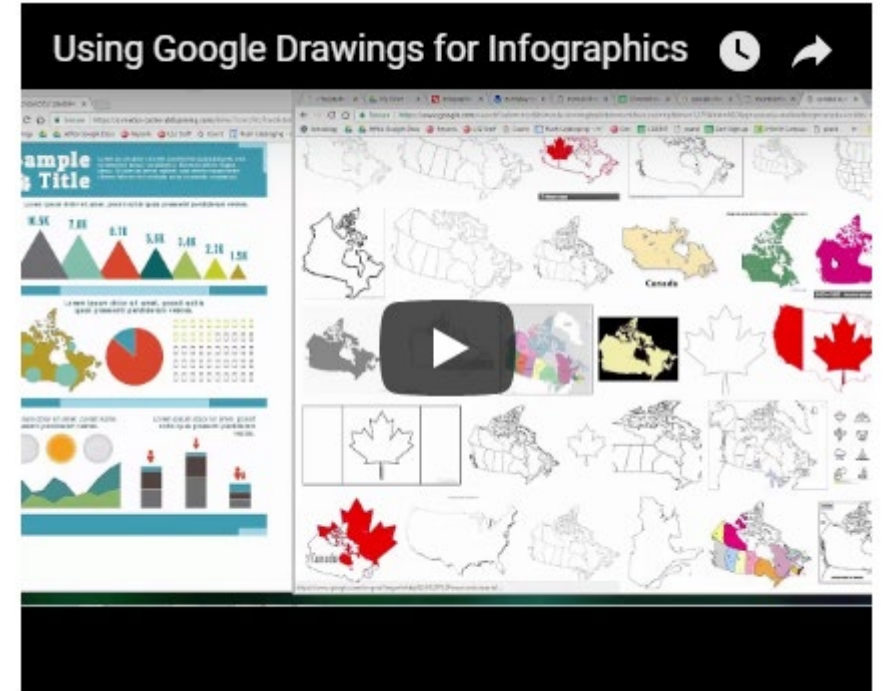
What if you're not good at art or using computers?
LOTS of free software, templates and online how to guides



Wordle



easel.ly



Infographic Student Project Outline

Step 1. Lecturer provides examples of:

Scientific infographics and educational projects that have used them

Free software students can use (e.g. PowerPoint, Google Draw, Piktochart etc)



Step 2. Students choose:

Topic THEY want to investigate

Tools they want to use



Step 3. Students:

Develop infographic over 10 weeks

Discuss content/ideas/progress with lecturer throughout

Infographic Student Project Outline

Step 4. Completed infographic

Student send link to/file of infographic to lecturer

Infographic posted on class Twitter account so all students can access, and printed on A4 sheets



Step 5. Research Symposium:

Twitter feed shown on plasma screen at poster session

Printed versions of infographics presented to other staff/students



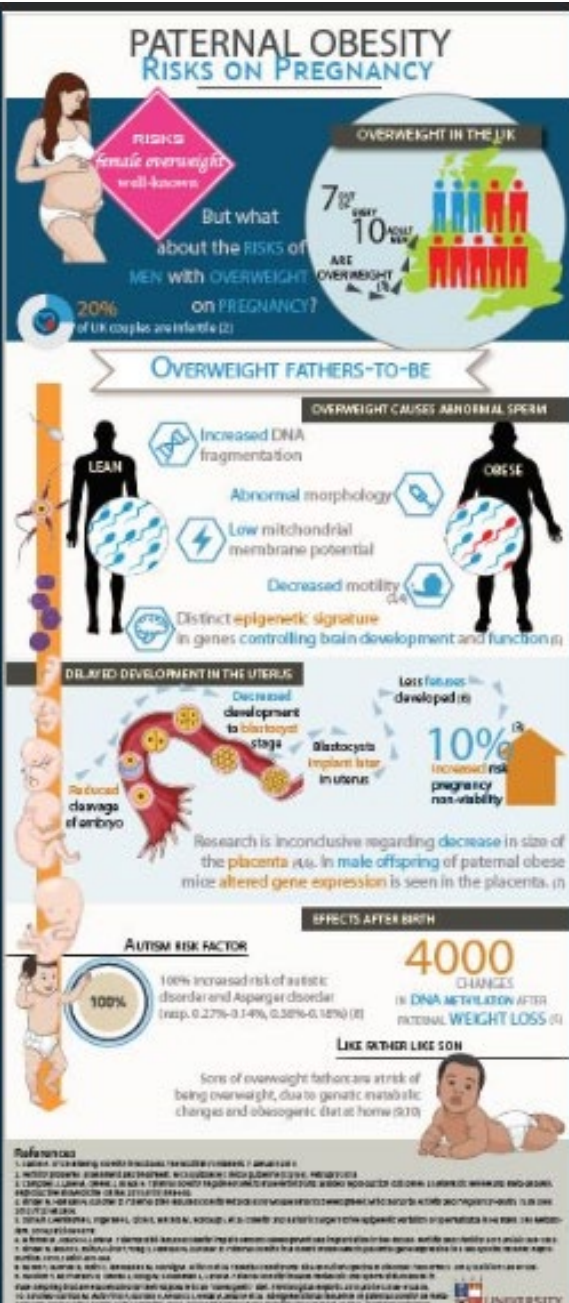
Step 6. Project graded via:

Peer and staff feedback on infographic using published criteria

Student submit detailed conference abstract about topic to be graded by staff

Method cont.

- We trialled this project with a Level 3 Junior Honours course (PY3002 Integrative Physiology), that had a mix of students of different disciplines, students articulating from FE colleges, and international exchange students. This course had previously used traditional scientific poster projects, which had become less popular with staff and students over the years.
- At the end of the course, an anonymous, voluntary feedback questionnaire was circulated to the class. Likert scores were used to record opinions for each question.
- Of a class of 50, 46 students responded with feedback on this pilot initiative.



Why do human females have permanently prominent breasts when other mammals do not?

By Joanna Bell email: joanna.k.bell.14@aberdeen.ac.uk

Peacocking around...

Flash their feathers as a mating technique > difficulties carrying bulk.

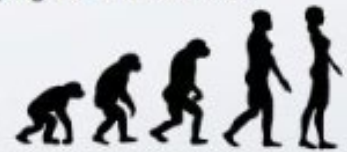
Large, fatty, breasts have a low metabolic cost > not always required to supplement milk.

Evolutionary device for reproduction > conferring an ability to breastfeed.



Evolution

Human females have evolved to have prominent breasts, even when not child-bearing or lactating. Present both pre-puberty and post-menopause, they vary in size throughout pregnancy and menstruation. This differs from other mammals, especially other apes. The derived sexual preferences of ancestral males have generated an adaption of an hourglass figure in human females, greatly contributing to sexual dimorphism. Breasts are a derived trait, formed to counteract the pressures of finding a mate, outweighing their metabolic cost.



Cancer Predisposition

Estrogen and progesterone > rapid cell divisions and apoptosis.

Large collagen expression > binds DDR2 from tumour cells > increases tumour growth.

BRCA1/2 mutations > immediate cancer risk.

Gynaecomastia is not cancerous.



Why not other apes?

- Display round, red buttocks
- Sexual attraction
- Reproduce often
- Attuned 'let-down reflex'
- Stimulated through sensory suckling of the nipples
- Humans reproduce less frequently
- Stimulation of hypothalamus
- Milk produced in response to crying/mother's feelings
- Not necessarily suckling



Oxytocin and Suckling



Udders vs. Breasts

- Udders have developed due to increased milk demand
- Herbivores are under pressure from predators



- Threat increased by presence of oversized udders weighing down
- Ligaments unable to support them
- 4 teats per udder—large supply
- Breast is best; provides antibodies and reduces atopy

Figure 1. The 'let-down' reflex of breastfeeding. Showing the relationship between oxytocin and suckling.

Study Blue (date unknown), Oxytocin and Suckling Reflex. (Online Image). Available from: https://doi.org/10.1007/978-1-4939-9947-1_11 (Accessed 17th Nov 2016)

Beale, V. (2013). Evolutionary Reasons for Male Preferences Regarding the Female Breast Shape. *Plastic and Reconstructive Surgery*, 112(5), e1042.

Beale, V. (2015). How heavy are breast cancer prophylactic mastectomies? *Breast Cancer Research*, 17, 1-5.

Quarles, F. (1993). Comparison of Breast, Cow, and Dog Feedings in the Prevention of Coronary Atherosclerosis. A 15-Year Prospective Study. *Clinical Pediatrics*, 32(8), 449-451.

Hill, D., Dixon, W. and Abigail, J. (1994). Structure and Function of the Cow's Udder. *Placenta*, 15(1), 1-5.

Beale, V. (2015). Breast Care: A Patient's Journey. *Journal of Obstetrics and Gynaecology*. Available at: https://www.researchgate.net/publication/271444444_Breast_Care_A_Patient's_Journey (Accessed 17 Nov 2016).

Udders vs. Breasts. (2016). *EVOLUTIONARY REASONS FOR MALE PREFERENCES REGARDING THE FEMALE BREAST SHAPE*. Available at: <http://www.breastcancer.org.uk/evolutionary-reasons-for-male-preferences-regarding-the-female-breast-shape> (Accessed 17 Nov 2016).

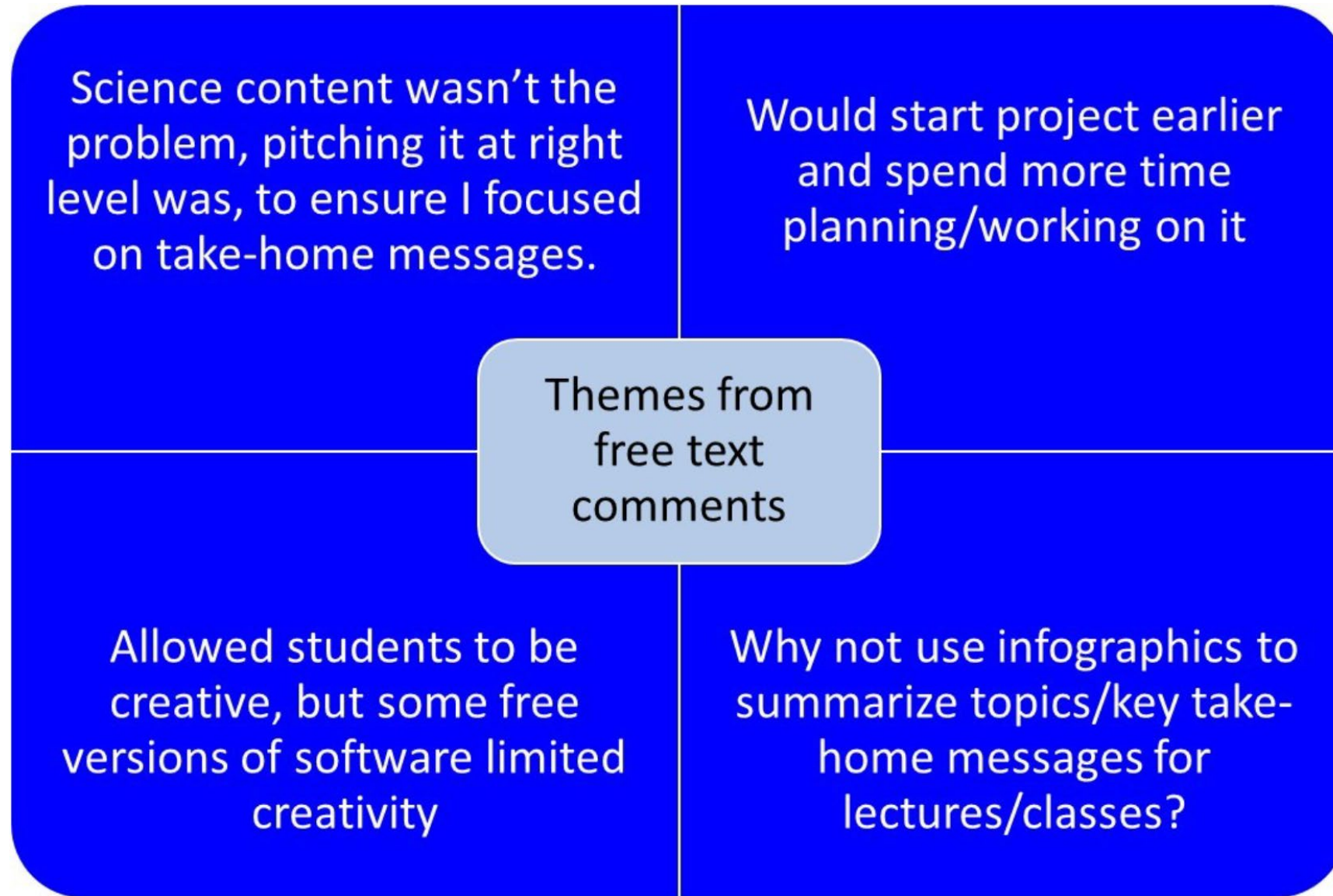
Beale, V., Hinde, K., Udders, K. and Higgins, J. (1997). Preference of male gibbon-related individuals of oxytocin-secreting responses by female gibbon-related individuals. *Experimental Brain Research*, 115(2).

Physio, J. (2015). Understanding the Oxytocin System: A New Paradigm for Aggressive Tumor Development. *Physical Therapy*, 135(10), 1915-1920. Available at: <https://doi.org/10.1093/ptj/135.10.1915> (Accessed 17 Nov 2016).

Beale, V. (2015). Why Do Women Have Breasts? (video). <http://www.breastcancer.org.uk/why-do-women-have-breasts> (Accessed 17 Nov 2016).

| Question | Mean Response | SEM | Likert score descriptors | |
|---|---------------|------|--------------------------|------------------|
| | | | Score of 0 | Score of 10 |
| Importance of topic YOU chose? | 8.65 | 0.19 | Not at all | Very |
| Easy to find/choose topic? | 6.63 | 0.30 | Very hard | Very easy |
| Work on own or team? | 2.46 | 0.38 | On my own | Part of a team |
| How easy to develop infographic | 4.30 | 0.29 | Very easy | Very hard |
| How easy to access/gather scientific content? | 4.50 | 0.34 | Very easy | Very hard |
| How easy to simplify scientific material to fit? | 5.17 | 0.32 | Very easy | Very hard |
| How easy to format/look good? | 4.72 | 0.35 | Very easy | Very hard |
| Rate enjoyment | 8.07 | 0.24 | Not at all | Very much |
| Compare infographic with standard poster in terms of how it looks | 8.83 | 0.21 | Much worse | Much better |
| Compare infographic with poster in terms of scientific info/content | 8.13 | 0.25 | Much worse | Much better |
| Satisfaction with infographic | 7.77 | 0.19 | Not at all | Very satisfied |
| Enough time for project? | 8.52 | 0.24 | Not enough | More than enough |
| Online or printed? | 3.13 | 0.36 | Online | Printed |

Free text comments from students



What did students use to create them?

- 91% of students used Piktochart software to create their infographic, but many found the free version limiting.
- Some students were inspired to learn how to use software like Photoshop to create more advanced imagery.
- This year, more students seem to be using Google Drawings
- Central independent university student feedback data for this class reported how students felt this task addressed their learning needs:

The poster research project

PY3002 INTEGRATIVE PHYSIOLOG



Summary

- This novel approach to student research project communication challenged teaching staff and students.
- Resources were either free or relatively cheap so could be used by anyone in any discipline wishing to undertake a similar project.
- Students seemed to feel positive about the project, were very engaged, and willing to be creative. No individual project was even remotely similar to another.
- Students appeared to give more thought as to how information should be presented and delivered for different audiences and became more critical of their own work.
- We feel this pilot initiative has been a success in terms of revitalising a project assignment, whilst teaching participants new skills and helping them further develop a range of graduate attributes.

*Transforming the world
with greater knowledge
and learning*