

COLLABORATIVE DEVELOPMENT OF INTERACTIVE LAB REPORT WRITING TOOL

Fran Clements and Anuj Bhargava

From University of Auckland, New Zealand

Outline

- **Share our experience collaborating in the design and development of e-learning resource**
- **How we designed the resource for active learning and learner engagement – share examples**
- **Reflections on process and future plans**

Faculty of Medical and Health Sciences

Libraries and Learning Services



Rationale

- Struggling Students
- Transition from Stage I to II
- English as a second language
- Different learning styles
- Student numbers

Approach

- Online resource
- Student friendly
- Accessible-24/7... learning on their own terms and in their spaces..
- Equity of access
- Strategic alignment, Graduate profiles
- Need for collaboration

Collaboration

- Academic staff, librarians, learning advisor
- Unique and shared skills, knowledge, experience
- Time factors
- Compatibility
- Equal partners
- Commitment to shared goal
- Facilitating student success

Pedagogy

- Blended learning
- Active learning
- Student-centred
- Foster independent, self-directed learning
- Motivate critical thinking and deeper learning

Design

- Platform
- Modular
- Consistent structure and framework
- Clear, simple, easy to use
- Selective or sequential

Engagement

- Learner-content interaction
- Authentic examples
- Ease of use – design and platform
- Diverse learning styles and preferences
- Flexibility of learning
- Relevance

Creating the resource

- Project plan – allocation of tasks, timelines
- Creation of content
- Review and feedback collaborative partners
- Usability and peer review – academic staff and students

Title

The title provides enough information for someone to understand what is contained in the report. Where appropriate, the title should indicate the purpose of the study, the subject (e.g. study population, organism, organ or molecule) and method or treatment.

Example

Original

"Lab report: Osmolarity and cells."

Whilst your tutor will know what your report is about, it is a good habit to write titles for people who will not know what the report is about.

Revised

"Effect of solution osmolarity on the rate of osmosis in red blood cells."

Clear and succinct title that describes the purpose of the study i.e. the effects of osmolarity on water transport in cells. The specific type of cell is also mentioned i.e. red blood cells.



Activity

Which title do you think would be appropriate for a scientific report?

- ☐ Effect of caffeine on heart rate and blood pressure in rats.
 - ✓ Correct. This report is studying effects of caffeine and the two measurements that being taken are included. This study applies to rats....
- ☐ Measurement of the changes in the amount of light transmitted through solutions of different osmolarities containing red blood cells and measured with a light intensity meter using Scope and Chart software.
 - ✗ This title is too long and wordy. For example, "Measurement of the changes..." is unnecessary – it is expected that you will be measuring something in the report.
- ☐ Effect of solution osmolarity on the rate of osmosis in RBCs measured using LIM.
 - ✗ Avoid acronyms in titles e.g. RBCs and LIM, unless they are common knowledge e.g. DNA.
- ☒ Lab 3
 - ✗ Your tutor will probably know what "Lab 3" means, but for anyone else it will be a mystery. Get into good habits now and add a relevant title after Lab 3:

Revised



Introduction

Most cells are freely permeable to water, which diffuses through aquaporins (water channels) in the plasma membrane. Water moves across the plasma membrane in response to the osmolarity (concentration of osmotically active substance in a solution) of the extracellular environment (Berne & Levy 1998).

Consequently, the osmolarity of the extracellular environment can change the volume of a cell. If a cell is placed in a solution of higher osmolarity than its internal environment, the cell will shrink as water moves out of the cell. Conversely, if a cell is placed in a solution of lower osmolarity, the cell will swell as water moves into the cell. In an isosmotic solution the cell will retain its original volume as there will be no net movement of water.

The effect of a solution on the volume of the cells suspended in it is described as tonicity (Boron & Boulpaep, 2009). An isotonic solution does not alter the volume or shape of cells suspended in it because the osmolarity of the solution is the same as the cytosol of the cell. However, a hypertonic solution will cause the cells to decrease in volume and a hypotonic solution will cause the cells to swell.

The unique, biconcave shape of red blood cells (RBCs) in isotonic solutions enables them to change their volume over a much wider range of solution osmolarities than other cells. The volume of the RBC is inversely related to the osmolarity of the solution. RBCs placed in a hypertonic solution will lose water and shrink. This is termed crenation, where the shape of the RBC becomes shrivelled and spikey in appearance (Tortora & Derrickson, 2009). If the RBCs are placed in a hypotonic solution, they swell until they are spherical in shape. Further swelling will cause rupture of the RBCs and the loss of their contents (largely haemoglobin) into the surrounding solution (haemolysis).

Red blood cells were used as a model to investigate the physiology behind the movement of water across membranes. Red blood cells were placed in solutions of different osmolarities and tonicities and changes in cell volume were measured using a Light Intensity Meter (LIM) with Scope and Chart software.

Comments

- More background information supplied so the reader has a better understanding of what the report will cover.
- Better explanations of how water movement relates to osmolarity.
- Related osmolarity and water movement to cell volume.
- Describes the type of cell used in the experiments and why these are used.
- What is expected to happen when red blood cells are placed in solutions of different osmolarities.
- A brief description of what the experiments will involve.
- Citations are included to indicate source of material used.






Activity with feedback

Activity

The following are statements from a laboratory report on the physiology behind the human dive reflex.

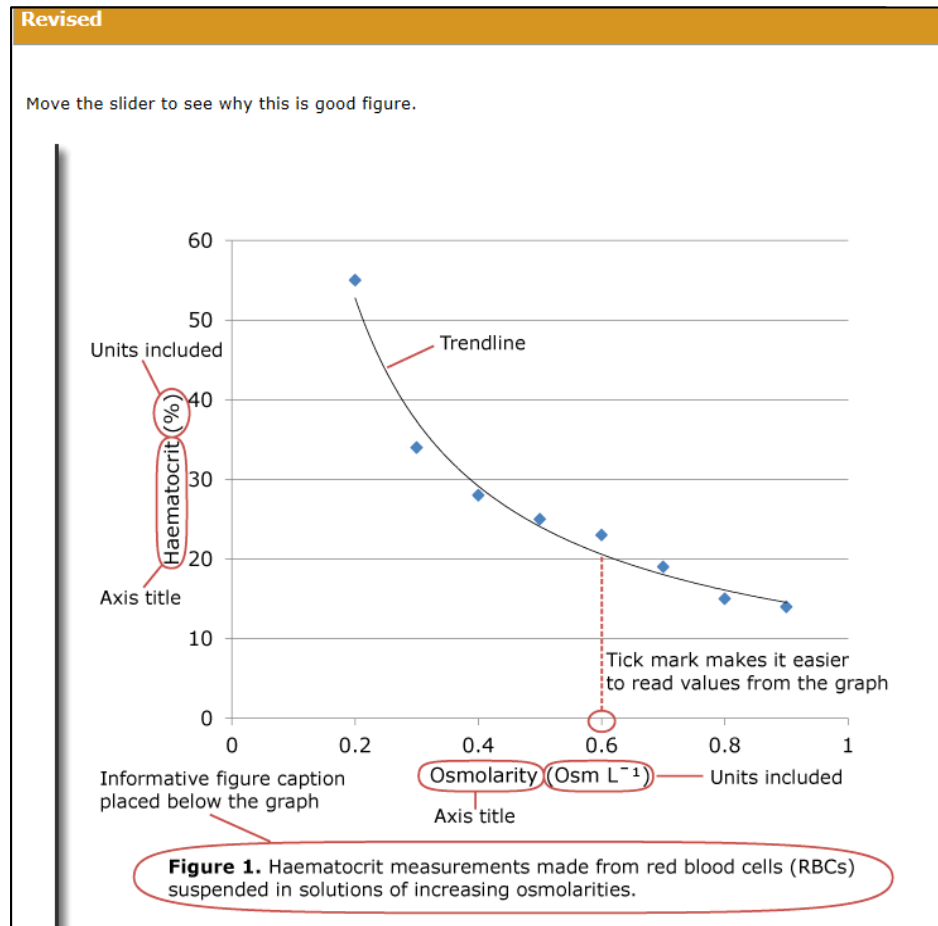
Click the statements that you think would be appropriate for the introduction.

Multiple answers are correct.

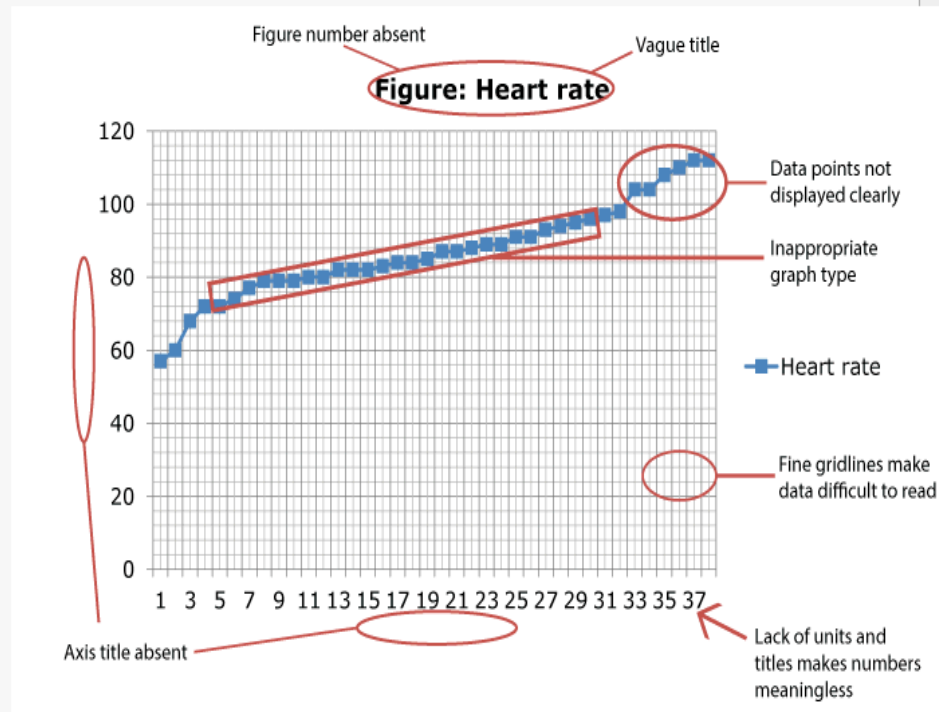
- ☒ Heart rate increased by 4% when the subject was exposed to cold water.
 -  Wrong location. This information would be better placed in the results section because it is describing the outcome of the experiment.
- ☒ In this experiment, a range of conditions were introduced to induce the dive reflex and to investigate which stimuli had the most pronounced effect on heart rate.
 -  Correct. The reader is being told what to expect from the rest of the report and the purpose of the experiments i.e. to investigate which stimuli has the largest effect of heart rate.
- ☒ The dive reflex in humans is the physiological response of the body to the changes in the external and internal environment that occur when a human is submerged in water (Boron & Boulpaep, 2009).
 -  Correct. This sentence explains the concept of the dive reflex and gives the reader relevant background information. The source of the information (Boron & Boulpaep, 2009) is cited.
- ☒ Heart rate was recorded as the subject held their breath during facial immersion in 15°C and 25°C. Recovering heart rate was recorded when the subject resurfaced and continued breathing for a further 30s.
 -  These sentences give detailed information about the methods used. This information would be more appropriate for the materials and methods section.
- ☒ Diving involves people swimming underwater.
 -  This information is irrelevant. Most people will know what the term diving means, so it is unnecessary to define this term. The laboratory focus is the human dive reflex rather than the act of diving.

Check Answer(s) You got 2 out of 2 answers correct

Results Section



Possible comments:



- Presenting the data as a histogram would show the ranges of the heart rate and the spread of the data. A line graph is more appropriate for showing relationships between two variables or trends.
- The title needs more information. For example whose heart rates were measured and under what conditions (e.g. resting)?
- There is no figure number. Numbering of figures and tables helps link the appropriate text to the correct figure.
- Axes are unlabelled.
- There are no units associated with the numbers making the data meaningless.
- The large, blue squares and fine gridlines makes the graph difficult to read.

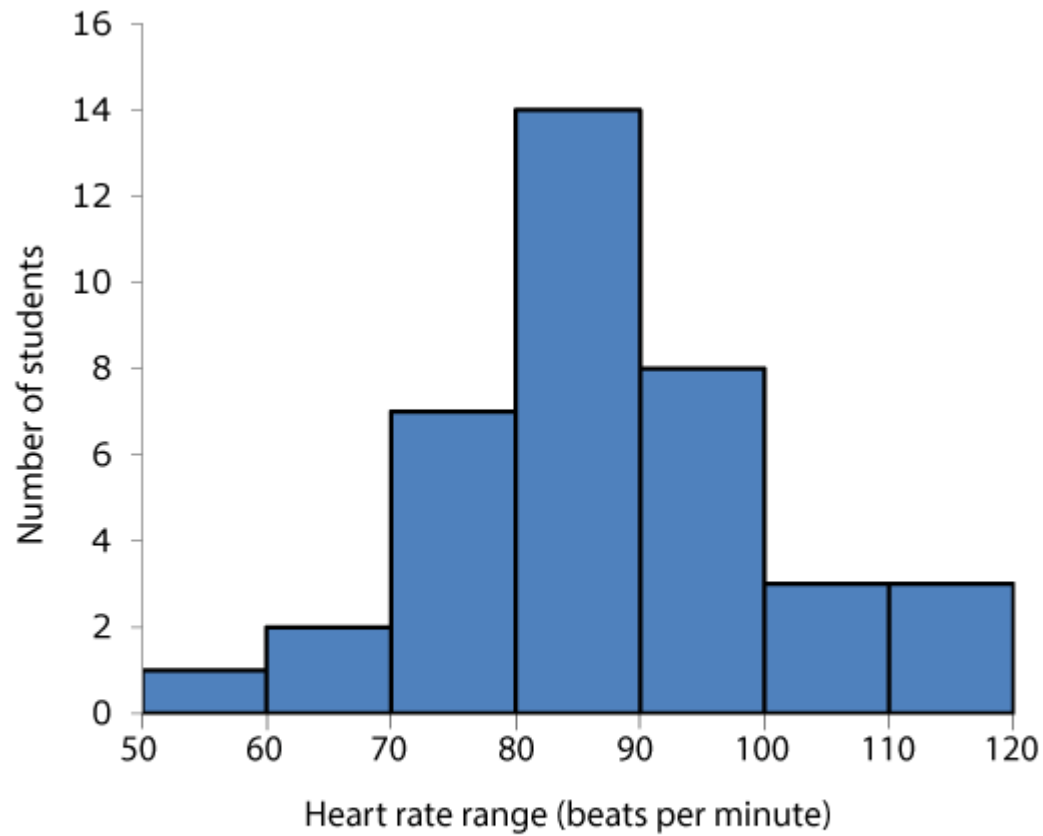


Figure 1. Resting heart rate ranges of undergraduate students.

References



Steve and James get a lesson on what, why, how to reference....

What is referencing?

When you write your lab report you will be expected to incorporate research and ideas of other scientists. Referencing is how you acknowledge someone else's ideas and research in your work. It is an important part of scientific writing and will help you to avoid plagiarism.

Referencing consists of:

- **Citation** - acknowledges research and ideas of others **in the text** of your report.
- **Reference list** - a list of the sources you have used **at the end** of your report.

References should appear in the following sections of your report:

- **Introduction** and **Discussion** section - in-text citations.
- **Reference section** - list of references at the end of the report.

Use a recognised, consistent style for citing and referencing other people's work. References will look different depending on the style you use. To find out which style you should use:

- Consult your course guide, or check with your tutor or lecturer.



Academic integrity signpost

For more information on referencing, see [Module 3](#) of the [Academic Integrity Course](#).

Activity

Choose the correct answer for each question from the drop-down menu:

1. A citation acknowledges your source --- of a document
2. You must include a list of the sources you have used --- of your report
3. Citations should be included in the --- section.
4. Citations should be included in the --- section.

Conclusion and Future Ideas

- Collaboration – successful
- Ongoing projects
- Analytics – usage of resource, student enquiries
- Qualitative data – to inform review of resource and development of additional resources
- Link to website:
- <https://flexiblelearning.auckland.ac.nz/lab-report-writing-101/>