Collaborative Enhancement Project 2022/2023

Optionality in Assessment: Case Studies

Case Study 8

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Institution: Imperial College London

Discipline/Field of Study: Biomedical Sciences

Type of Assessment: Oral presentation, written exam & laboratory project report

Credits: LP1 15 ECTS credits overall assessed by three assessments each weighted 33.3%: practical exam, lab book, and oral assessment, LP2 15 ECTS credits overall, assessed by two assessments each weighted 50%: laboratory project report and written exam.

Level: 4

Unit Type: Mandatory or core for all students on a particular programme

Type of Optionality: Optionality resides in the process of choosing a key research area, and the strategy to investigate it. Importantly the outcome of the research is not assessed, but how data and concepts are presented and critically interpreted is.

Assessment Details:

In this case study we present the rationale for providing students with options regarding the research project they undertake in the laboratory practical Lab Pod 1 and Lab Pod 2. The optionality resides in the process rather than the type of assessment. Students' choices involve key aspects of the research investigated including the molecular targets, research hypothesis and experimental planning. In Lab Pod 1 oral presentation and Lab Pod 2 written report students can decide which data set, generated in their research, they will present and the appropriate supporting material.

Moreover, the Lab Pod 2 exam involves the analysis of a data set based on which students need to identify a research gap, develop a research hypothesis and outline 3 key experimental plans of their choice to investigate their hypothesis.

a. Instructions for completing the assessment

how-to-write-a-scientific-report-for-lp-2-3UmexYZt.pdf

Lab Pod 2 Report Instructions.docx

CS8_LP1_oral_presentation___student_guideline.pdf

b. Marking rubric

CS8_Lab Pod 2 report rubric .docx

CS8_Experimental planning rubric student version.docx

CS8_LP1_oral_presentation___student_guideline.pdf

Lab Pod 1 Oral Presentation Assessment Instructions and Marking Rubric 2022-23

Concisely and accurately communicating your work to your peers is a vital part of undertaking scientific research. While a research article may be the final outcome of a project, the most direct and accessible method for communicating is through presentations at scientific meetings, conferences, and seminars. The audience could be your lab group, colleagues at your university, or national and international experts in the field. These presentations often distil years of work into only a few minutes. You are not expected to show every experiment performed, or all the data generated during your study. Instead, the aim is to build a story that tells the audience why your project is important, what you did, the key results you obtained, and what the results tell you regarding the overall aim of your project.

Here you will individually present your Lab Pod 1 project. You will have six minutes to present followed by three minutes for questions - this replicates a common format you would find at a scientific conference. This will be assessed and forms 33.33% of your Lab Pod 1 module grade.

The following structure of seven slides must be used:

Slide	Feature	Detail
1	**Title**	A brief informative title describing the key take away message of your project. You should also introduce yourself.
2	**Introduction**	A slide that will capture your audience's interest, give them a context for your work, pose your central question (your hypothesis) and establishes a framework for the rest of the presentation.
3-5	**Results**	You have 3 slides to show your results related to your three aims and your interpretation of them. Each slide should contain a figure with no more than three panels. You should also briefly describe the experimental conditions.
6	**Conclusions and Future plans**	You should summarise your overall findings, draw conclusions from them that relate back to the overall aim of the project, and suggest future work that would logically follow on from your project. You can present your findings visually in the format of a graphical abstract (optional).
7	**Acknowledgements**	A slide acknowledging your teammates and those who helped you during your project.

Oral Presentation Marking Guidelines 2022-23

Verbal presentation

You should speak clearly and precisely at a suitable volume and pace to be understood. The language used should be appropriate formal scientific language and should not include colloquialisms, slang, or unexplained abbreviations. Your style should be engaging, and you may wish to make use of pauses for emphasis, varying cadence, repetition, or other methods for emphasising key points.

Body Language

To effectively tell your story to the audience you need them to engage with it. One aspect of this is presenting in a dynamic appealing manner. This means you should be speaking to the whole audience, looking up at everyone, and making eye contact with them. You can use gestures or expressions to emphasise points, but these should be appropriate to the situation; overuse can be off-putting. Conversely, if you present in a dull, static manner, consistently looking down at your notes, or talking to your slides, the audience will find it difficult to become invested in what you are saying.

Timing

Your talk should fill the majority of the time assigned to you but should not exceed it. This is important as, just like at a conference, there will be many talks scheduled and even small overruns in time can lead to long delays over the course of a session. When you have reached the end of your six minutes you will be asked to finish the slide you are currently presenting, and to then move on to questions. It is therefore important to practice your talk to ensure you get the timing right without having to rush to fit everything in, or slow down to fill time.

Slide Presentation

Slides should be presented in a coherent, attractive, style of your choosing using the required seven slide format. Font style and size should be consistent throughout and should be at an appropriate size to be legible to the whole audience. The slides should be titled with the key message for each slide and allow the reader to follow the message of the talk in the absence of the speaker. That does not mean every detail must be included in text or image on the slides, in fact slides should not contain too much text, or be cluttered with excess images or animations. All slides must be of your own design and different from your teammates in both design and text.

Introduction and Background

Your introduction/background slide will introduce the topic to the audience. The slide should not contain any data. As you present this slide you should briefly explain to the audience the background of the project, why it is important to conduct this research, and the knowledge gap you identified. Then you want to introduce your hypothesis and aims and mention how you addressed them experimentally.

Data Presentation

For each aim you addressed (cell viability, gene and protein expression) you should present a single figure with no more than three panels containing graphs, images, or tables. The figure should be an appropriate size to be seen legibly by the whole audience. This should be data you and your team has obtained and may be the results of a single representative experiment or, where appropriate, the combined results of multiple experiments. If you do not have complete data for a single experiment for any technique you should show a result representative of what you have and explain what is missing/wrong with the data. The data should be presented in an attractive style, and should be correctly labelled, and contain all the information needed for interpretation.

Data interpretation

You should present to the reader your interpretation of the data you have obtained demonstrating that you understand the biological significance of your work. Statistics and

controls should be mentioned where appropriate, acknowledging their importance and the information they provide when interpreting your data. If presenting data with issues preventing interpretation, you should explain what those issues are, and why they prevent relevant biological interpretation of your data.

Conclusions

This section allows you to show you understand how your project relates back to the 'big picture' of the topic. You should describe the overall meaning of the data you obtained, and draw logical conclusions relating back to your hypothesis and the aims of the project. You should acknowledge limitations in your work and suggest future directions for research. This should go beyond suggesting simple repeats, but develop on your findings, or suggest alterations that would improve your outcomes. You should be careful not to overstate the strength of your conclusions. This slide could also be in the format of a graphical abstract as a visual summary of your work. It should be attractive and easy to understand in the absence of a speaker. You may use animations, highlighting or other methods to aid you as you present the figure.

Discussion/Questions

You will receive two questions from TFs at the end of your talk. One about one of the methods used, and one about the scientific theory supporting your project. You will have three minutes total to answer these questions. You should provide a concise answer to each that is relevant to the question asked and demonstrates your understanding and insight into the topics. You will be asked to stop after three minutes to prevent overrunning your time, so it is important to directly address the question.

The following **criteria** will be used to assess on your presentations:

Criteria	0-39	40-49	50-59	60-69	70-80	80-100
Verbal presentation **(15%)**	The speaker **was not audible** or was unintelligible throughout.	**Significant portions** of the talk were **not audible** or were unintelligible. They generally spoke with an **inappropriately fast/slow pace** OR used **inappropriate language** throughout.	The speaker was **generally audible** with clear diction. They **generally** spoke at an **appropriate pace** and used clear, **appropriate language**.	The speaker was **audible** with clear diction except for a **few lapses**. They spoke at an **appropriate pace** and used clear, **appropriate language** except for a **few lapses**.	The speaker was **audible** with clear diction **throughout**. They spoke at an **appropriate pace** and used clear, **appropriate language throughout**.	The speaker presented in an **exceptionally engaging manner**. They were **audible** with clear diction **throughout**. They spoke at an **appropriate pace** and used clear, **appropriate language throughout**.
Body Language **(10%)** **(0% if online)**	The speaker **did not** look at and/or **face** the **audience throughout**.	**Significant portions** of the talk were spent **looking down** at notes or at the slides. Significant portions of the talk were spent **facing away** from the audience.	The speaker **generally** had **good eye contact**, looking at the audience and not slides/notes. Talk was **directed to** only a **few people**. Speaker was **generally facing** the **audience**.	The speaker had **good eye contact**, looking up at the audience and not slides/notes. **Speaking to everyone** and not to just one or two individuals. A **few lapses**. Speaker was **facing** the **audience**. A **few lapses**.	The speaker had **good eye contact throughout** looking up at the audience and not slides/notes. **Speaking to everyone** and not to just one or two individuals. Speaker was **facing** the **audience**.	The speaker presented in an **exceptionally engaging manner**. **Good eye contact throughout** looking up at the audience and not slides/notes. **Speaking to everyone** and not to just one or two individuals. Speaker was **facing** the **audience**.
Time **(10%)**	Used **<3 mins**. OR continued on after being **told to stop**.	Used **<4 mins**. OR only reached slide 2-3 before time ran out	Used **<5 mins**. OR **only reached slide 4-5**	Used **5 min to 5 min 30 s**. **OR** Ran out of time on final slides	**Used full amount** of time available **without going over** time.	**Used full amount** of time available **without going over** time. **Never rushed** to meet time limit, **or slowed** down to fill time
Slide Presentation **(10%)**	Slides are too disorganized or the design is **too poor** for them **to be understood.** OR slides are **plagiarized**	Slides are **frequently** too **poorly designed** to easily follow. **Font** size/font is **inconsistent**, and **generally too small**.	Slides are **occasionally poorly designed**, or formatting is **inconsistent**. **Font** size/font **occasionally too small** or the formatting is **inconsistent**.	Slides have an **appropriate** and **consistent design.** A **few lapses**. **Font** is **readable**, and **consistent** in size and font **throughout**.	Slides have an **appropriate, consistent** and **attractive design.** **Font** is **readable**, and **consistent** in size and font **throughout**.	Slides have **exceptionally attractive consistent design**. **Font** is **readable**, and **consistent** in size and font **throughout**.

Criteria	0-39	40-49	50-59	60-69	70-80	80-100
Introduction and Background **(10%)**	**No introduction / background** information provided. OR text on slides is **plagiarised** OR statements made are **irrelevant** to the topic.	Introduction mentions only a **few relevant points**	Introduction covers topic but **omits** several **important details**	Introduction **covers** most **important details. A few lapses**.	Introduction **covers** all **important details.**	A concise **comprehensive introduction** to the topic
Data presentation **(15%)**	**No data** presented. OR Figures are **plagiarised**	**Images**/figures are **generally poorly chosen**, or inappropriately sized, and **poorly presented**.	**Images**/figures are **occasionally poorly chosen**, or inappropriately sized, and **poorly presented**	**Images**/figures are **generally** well **chosen**, appropriately sized, and **well presented**. **A few lapses**	**Images**/figures are **well chosen**, appropriately sized, and **well-presented throughout**.	**Images**/figures are **well chosen**, appropriately sized, and **exceptionally presented throughout**.
Data interpretation **(10%)**	**No interpretation** of data attempted OR Data interpretation is **irrelevant** to the topic and data presented	Some interpretation attempted but only a **few relevant points** mentioned OR Data interpretation is attempted but **all incorrectly performed**.	Interpretation attempted for all experiments but **omits** several **important details** OR Data interpretation **incorrectly performed for 2 techniques**	Interpretation attempted for all experiments. **Covers** most **important details. A few lapses**. OR Data interpretation **incorrectly performed for 1 technique**	Interpretation **covers** all **important details** including **controls.** AND Data interpretation **correctly performed for all techniques**	Interpretation **covers** all **important details** including **controls.** Demonstrates **exceptional insight** AND Data interpretation **correctly performed for all techniques**
Conclusions **(10%)**	**No conclusions** and suggested future work presented. OR Conclusions and future work suggested are **irrelevant** to the topic	Section mentions only a **few relevant points** OR **No future work suggested**	Section **omits** several **important details** OR **Future work** limited to **repeats** Additionally Presented in the format of a graphical abstract but **inappropriately contains data**	Section **covers** most **important details. A few lapses**. **Conclusions** are **generally appropriate** to the results obtained Future work contains at least **one new experiment**. Additionally	Section **covers** all **important details.** **Conclusions** are **appropriate** and **relate** back **to** the **overall aims** of the project Future work contains at least **one new experiment**. Additionally	Section **covers** all **important details.** **Conclusions** are **appropriate** and **relate** back **to** the **overall aims** of the project AND The experiment(s) suggested for future work demonstrate considerable understanding of the techniques used,
				Appropriate graphical abstract presented	Appropriate **attractive graphical abstract** presented	or suggesting novel AND relevant methods outside the scope of LP1. Additionally **Exceptionally** attractive, well designed **graphical abstract**
Discussion /Questions **(10%)** **(15% if online)**	**No answers** offered to both questions. Or answers were **irrelevant** to the questions asked	Answers revealed **significant errors in** understanding of **both theory and methods** OR **No answer/irrelevant** answer for **one question**	Answers demonstrate **understanding of** both **theory and methods. Omits** several **important details** OR Asked to stop due to **exceeding time** for questions.	Answers demonstrate **appropriate understanding of** both **theory and methods.** A **few lapses**. OR **One** answer demonstrating **good understanding. One** with **significant errors** in understanding Answers **within time**	Answers demonstrate **good understanding of** both **theory and methods** Answers **within time**	**Exceptionally insightful answers** to both theory and method questions Answers concise, clear, and **within time**
Criteria	**0-39**	**40-49**	**50-59**	**60-69**	**70-80**	**80-100**

c. Teaching materials:

CS8_lp-2-18-exam-preparation-Vxcya6t9.pdf

CS8_Lab Pod2 exam guidance.pptx

CS8_Lab Pod 2 individual report preparation guidance- part 1.pptx

CS8_Lab Pod 2 individual report preparation guidance- part 2 .pptx
CS8_how-to-prepare-your-lp-1-oral-presentation-dgmdS3ae.pdf

Short overview of how students are supported in their choice
Lab Pod 1 is a Y1 module and often the first-time when students experience practical lab work at university level. To guide and help students to generate a new project/hypothesis that they want to pursue over the academic year, the teaching

team sets some boundaries. For example, the teaching team sets the overarching topic/field of research for the current year (I.e., stress and cancer, eCigarettes flavouring, microplastics, etc). At the beginning of the module students get introduced to this topic and why it is important to perform more research. Then, students are given the choice of three signaling pathways (apoptosis, DNA damage repair or autophagy) they want to investigate and within those there are several targets, like genes and proteins, they can choose to base their hypothesis on.

Limiting the targets, we ensure students are not getting overwhelmed by unlimited choice and they are set up for success for their experiments, as conditions have been tested for each target, while still allowing them to take ownership and choose a project they are interested in. Although target choice is limited, every hypothesis needs to address a novel question, students are not allowed to just replicate publish scientific discoveries.

Then during the academic year, the teaching team provides constant feedback and support to the students. For example, we discuss their hypothesis during a F2F session and provide feedback. Weekly feedback is provided to a OneNote entry where students summarise their experiments every week. Furthermore, students are supported within the labs while conducting experiments as well as as outside the labs through discussing the progression of their project before students must present their chosen results in form of an oral presentation.

Lab pod 2 students are prepared for the assessment throughout the entire academic year. In term 1 students have weekly theory sessions, when they are introduced to the research area and scaffolding sessions to support them in developing their hypothesis few examples include:

1) A journal club where they present the most relevant paper they read about the research they want to undertake
2) A project pitching exercise with supervisors
3) Experimental planning interactive session

Term 2 and 3

1) Formative experimental plan and selected aspects of the lab report.
2) Students are provided with eModules with guidance for the assessments. These also include the signposting of similar activities undertaken routinely in the lab.
3) These are followed by Face-to-face sessions where students can discuss any aspect that is not clear and activities such as critiquing a paper and parts of previous anonymized project reports

d. Other links or pertinent information

The Lab Pod modules (LP1 and LP2) within the BSc Medical Biosciences (BMB) programme are the practical modules of Year1 and Year2, respectively. Within these modules students learn how to think and work like scientists. In both years students work in teams of six students that must identify a knowledge gap in a particular biomedical science area and generate a novel hypothesis to address this

gap. Students in year 1 are given the choice of three signaling transduction pathways and within each there are a few possible targets they can investigate. Then they work over the whole academic year to learn techniques while producing data towards their hypothesis. In their final assessment, an oral presentation, students must present a dataset for each of the techniques taught but are completely free in which dataset recorded by their group they want to present. In Lab Pod 2 students are given a broad research area, they need to read about and identify a knowledge gap and develop a research question and a hypothesis. They have some restrictions about what type of material they will use (for example specific cell type or reagents) but have ample choice in identifying the specific research papers and area of investigation, and the target gene they will manipulate to test the hypothesis they formulate. They are also given the choice of 4 technical assays, and they can choose the one they feel is the most appropriate to test their hypothesis. They then formulate an experimental plan with multiple experiments and investigate it over two terms. These are preceded by one entire term of preparation and (mostly theoretical). The two final assessments consist of 1) Written exam: Students are given a set of data and an excerpt from a book chapter. Based on the interpretation of the data provided and information given they should identify a knowledge gap and formulate a hypothesis. They then need to outline 3 key experiments of their choice suitable to test the hypothesis they formulated. 2) Laboratory project report: Students work in a group to produce the data for validating their initial hypothesis but need to write an individual report outlining and discussing their findings in the format of a research paper. The choice of data for their interpretation and discussion is open to each individual. By giving students the chance to generate their own hypotheses with their chosen targets, they develop ownership of their project. The transition from Y1, where students are more scaffolded and assisted by teaching staff with generating this hypothesis and their planning and organisation of experiments, into Y2, where students have more freedom and take on more responsibility for their project, helps students to develop into independent learners. In addition, teaching approach, intended learning outcomes and students' choices are aligned with assessments. For example, in the exam students develop their own hypothesis and experimental plan (free choice of methods), while in the report or oral presentation students can choose what they think is most relevant data and their interpretation to present.