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| Case Study 1 -Life Sciences | |
| Contact: Dr Chris Harvey eMail: chris.harvey@canterbury.ac.uk | |
| Setting | Second year module (Level 5) in a Life Sciences Department (module title: ‘Communications and Analysis in Science’). The module aims to introduce students to methods and strategies for developing testable hypothesis, designing and carrying out experiments and analysing the data obtained. |
| Cohort Size | Approx. 65 students |
| Learning activity | The module contains a series of six two-hour sessions in which students would work in small groups (two to three students each) to design, carry out and report on a simple laboratory experiment. Students were provided with a list of materials and equipment they could use to design an experiment of their choice. This provided students with a lot of freedom, but also required them to think ‘like a scientist’ and make decisions on critical aspects of experimental design, including what to measure and how to measure it, how to ensure sufficient replication, how to risk assess their proposed protocol of work and how to make sure the hypothesis they aimed to test was aligned with the experimental design. Thus, this learning activity required students to develop several new and applied skills and represented their first experience of working independently toward a research aim. Students had six sessions two hour sessions (one briefing, five sessions to develop and execute the experiment), so were required to develop and apply these skills in a very short period of time. The learning experience was specifically designed to prepare students for their final year dissertation project, which would require them to use the skills learned during this learning activity. The skills learned were summatively assessed by an online research log book for which students had to complete weekly entries. |
| Traffic Lights Toolkit elements used | Perception of Challenge Tool, Rating Scale Tool |
| Mode of delivery | Digital (Excel spreadsheet). The Traffic Lights Toolkit (Perception of Challenge Tool; POC and Rating Scale Tool; RT) was delivered as part of the summative assessment for this learning experience by being integrated into the online log book students had to complete. |
| Number of engagements with the Toolkit | 4 |
| Aims | The POC included statements relating to the skills students were to develop and that were being assessed. Reflection is an integral process in designing experiments and optimizing experimental design as well as in the process of analysing and interpreting experimental results, so asking students to engage with the Toolkit was intended to signpost the required skills for students, encourage reflection on new skills learned on a weekly basis as well as on the experience of designing, executing and analysing the results of an experiment overall. The PoC tool was included to facilitate this process. In addition, students were encouraged to use the tool to identify skills they were already confident in and skills for which they lacked confidence, therefore allowing them to identify where they needed support from lecturers and instructors during practical sessions. The RS Tool was chosen to help students articulate and concretize this process for one skill in particular that they had particularly low confidence in. The Toolkit was integrated into the summative assessment to provide structure to the engagement with it and encourage engagement. |
| Methods | First use of the Toolkit:  Students were briefed on the assessment and the schedule for the practical sessions for one hour. In the following hour, they were then briefed on the POC and RS Tools and the aim of including them as part of the summative assessment. Students were told that they would be assessed on their engagement with the Tools, not on the content of the Tools they completed. Students were introduced to the online log book (on PebblePad) in which the Tools were integrated as the downloadable template spreadsheet available with this document. The POC Tool had twelve statements, grouped by the themes ‘Project preparation’ and ‘Project execution’. For each statement, the POC Tool included a space to indicate the traffic light colour, a space for adding a numerical confidence rating (1-10) and a space for notes, thoughts and comments. There was one RS Tool included in the spreadsheet, for use with the lowest-rated statement. The use of the POC and RS tools were explained and students were then asked to complete the first copy of the tool as part of the briefing session. They had approximately half an hour for this activity. They were encouraged to reflect on their confidence levels at the moment and were encouraged to add any notes, thoughts and comments in the provided spaces so they could articulate for themselves and for the lecturer/instructor why they felt a certain way. Students were then shown how to upload their completed tool to the online log book and were asked to do so before they completed the session.  Subsequent uses of the Toolkit:  As part of their online log book, students were required to complete and submit additional spreadsheets with the POC and RS Tools once they had completed entries in their online log book for the second, third and sixth week of the subsequent practical sessions. Each spreadsheet coincided with the development of skills. In week 2, students had to originate a research question and derive from it a testable hypothesis as well as propose a measurement and sampling strategy. In week 3, students had to compose a protocol for their experiment and submit a risk assessment. In weeks 3 and 4, students had two hours each week to carry out the experiment. In week 5, students had to provide comments on a) their reflection on their experience and what they had learned, b) a suitable approach for data analysis, c) an interpretation of the data they had obtained, and d) suggestions for future research based on their experiment. |
| Sharing outcomes | The data from the submitted POC/RS spreadsheets were then anonymized and compiled and presented to students in the final session of the module to support discussions looking ahead to their final year dissertation project as well as exploring the general principles and utility of reflecting on learning and identifying strengths and weaknesses. |