Inquiry-Based Learning Design Overview

Information Literacy in Research Methods

1. The students and the curriculum

There were 113 first year undergraduate Psychology students registered on this core second semester, 10-credit module (Methods and Reasoning for Psychologists).

2. The teaching and learning aims

Broadly, this module aimed to develop students’ independent research skills by providing them with tasks that were closely modelled on those that academics have to undertake in their own research. As postgraduate tutors were responsible for running the tutorials in which the IBL activities were carried out, the datasets created for the students to work on were deliberately linked to the research interests of the postgraduates.

This innovation responded to lack of student engagement with traditional, lecture based “Research Methods” classes and the difficulties that students were having with transferring the skills learned in these courses to new contexts, for example the design and analysis of their own independent research projects.

3. The inquiry/inquiries

In the first activity students engaged with the Web of Knowledge database, building on competencies developed in the first semester. Students worked collaboratively to identify papers using different methods to address a particular topic and discuss and critique the research methods used across them. They focused on the ways in which alternative methods have been used to extend and test the validity of the original results. They wrote up their work together in a single collaborative literature review.

For the second activity, an experimental design and statistical analysis task was introduced. It introduced students to the entire research process: selecting a question; formulating a hypothesis; designing an experiment; choosing a statistical analysis; running the analysis on simulated data; and reporting and interpreting results. Students were required to choose a meaningful research question (from a list of three established by their tutor), carry out appropriate statistical analysis and critically evaluate the relevant literature. The inquiry was carried out collaboratively. In the first tutorial, tutor groups comprising four or five students met with a postgraduate (PG) tutor. The postgraduate tutors had each identified an appropriate seed paper based on their own area of research expertise and it was from the topics of these papers that the student inquiries emerged. In a second tutorial each group was given 2 laptops that had a preloaded dataset (related to the topic of the first tutorial) running on them in SPSS statistical software. Student groups then decided how they were going to engage with and answer a set of questions provided on the dataset (their research project reports had to be submitted by the end of the session).

4. The assessment

Student groups produced a single group report summarising the original paper and comparing it with the subsequent papers they found on Web of Knowledge. Each group member received the same mark for this project and it contributed 8% of the course mark. Students also completed an individual reflective piece on
the process of searching the literature and working together as a research team. In the marking scheme particular credit was given for identifying ways in which future performance could be improved.

In terms of the statistical analysis sessions, students were presented with five questions at the start of the tutorial. The first four questions were marked on whether the correct statistical test had been chosen to answer the given question, whether it had been conduct properly, reported correctly, supported with appropriate data, and interpreted accurately. The fifth question, which asked the students to choose their own test, was assessed on whether the question they decided to ask was appropriate as well as on how well it was applied. At the end of the second session the students saved their responses and submitted them as a group. There was only one submission from each group and all students received the same mark. Performance on this activity contributed 10% to the course mark.


5. The ‘process support’

The information literacy element was supported initially by a postgraduate tutor run seminar. Here instruction was given on searching the Web of Knowledge. The tutor also introduced their own research area, which would be the topic of the literature search, and previewed some of the research methods that the students might find. The students then conducted the search over the next week. They were supported by a tutor-moderated discussion boards in the virtual learning environment. They could discuss their search strategy amongst themselves and with their tutor here, and check that the papers they had found were appropriate. They then had a further week to write the literature review together.

For the statistical analysis activity, postgraduate tutors prepared three questions derived from their research area. These were presented to the students at the start of the introductory tutorial and they were asked to choose one to focus on. There followed a tutor-led group discussion about how to design an experiment to address the chosen research question. As the discussion progressed the group filled out a generic research proposal form that revised their experimental design knowledge and contained all the information necessary for data to be simulated for their design. In the next tutorial students were given an instruction sheet that described the variables in the generated data set and five questions that the students needed to answer using the dataset. The first four questions required one of the following in order to be answered correctly: correlation, related t-test, unrelated t-test and chi-square analysis. The fifth question asked the group to “Choose one further analysis to run based on your dataset.” Students were instructed to write up the answers, including graphs and tables of descriptive statistics (not inferential statistics) as appropriate. They had to quote test results in the conventional format and provide brief interpretation. The students were permitted to consult notes and textbooks.

6. The information resources and strategies

As was noted above, the tutorial programme was closely integrated with compulsory research methods lectures which the first years were receiving at the same time. The lectures addressed descriptive statistics, experimental design, t-tests, Pearson correlation and simple contingency table analysis.

In the tutorials students were presented with a seed paper identified by their postgraduate tutor.

7. The tutoring/facilitation approach
The postgraduate tutors were essential to this project. They facilitated the individual sessions, set up the topics to be investigated and provide assistance with running analyses where necessary. Tutors received training in advance of teaching these classes.

8. The learning technology

Extensive use was made of the institutional virtual learning environment. For example, a discussion board was used in conferencing between student groups and their postgraduate tutor.

Laptops were used in a number of ways, for example in the analysis workshop (to examine datasets) and to demonstrate Web of Knowledge.

9. The learning spaces

Students worked collaboratively in small groups in standard teaching rooms and were facilitated by postgraduate tutors.

10. What really worked

Students developed their skills in independent study, research design and analysis to a higher level than previous cohorts, as well as their information literacy skills in interacting with electronic information resources and critically evaluating that information.

The opportunity for students to set their own research questions and get directly involved in research design filled a gap in the Psychology curriculum (something which even higher level students sometimes do not get the opportunity to engage in), providing

'A very nice, safe environment to design the experiments.' (project leader comment)

The activities were very effective in teaching students information literacy skills. Student feedback clearly indicated that they were much more confident in using Web of Knowledge (something that they are meant to be able to do through levels 2 and three; but which many of them cannot).

In terms of statistical analysis, students also improved substantially, possibly because the simulated datasets

'Gave a much more realistic view of what it was like conducting analysis in real world research.' (project leader comment)

It is hoped that this will allow students to generalise their skills into new contexts at levels 2 and 3.

The majority of students seem to have enjoyed working collaboratively and developed their capabilities in working in groups:

“The tutorial work I participated in gave me good experience of what it is like to work collaboratively with others, and what kind of decisions need to be made in order for a successful piece of group work to be produced.” (student feedback)

“I think that there should be more group work as this allows you to develop skills, learn how to understand and evaluate things better, and also allows you to meet and interact with others on your course.” (student feedback)
It is also worth noting that student feedback consistently commented positively upon the contributions of the postgraduate tutors to their learning.

The following graphs summarise student feedback data:
As a result of doing the activities in the tutorial task I feel more confident using the Web of Knowledge database

As a result of doing the activities in the tutorial task I feel I have improved my ability to evaluate information in the published literature

As a result of doing the activities in the tutorial task I feel I have improved my ability to solve problems in psychology

As a result of doing the activities in the tutorial task I feel more able to formulate research questions

I found this inquiry-based learning activities enjoyable and motivating

I feel that this inquiry-based learning activity encouraged me to take an active role in the class

11. Things to build on and/or do differently next time around

A few students felt that the reflective piece of writing was not particularly useful and if it had not been assessed it is likely that few students would have done it. Also, at only 2% of the total module assessment, it did not really make much difference to the module assessment. The tutor found it difficult to assess. Finally, some students felt that it was badly timed (submission was only 2 weeks before their exams).

Students wanted more face to face contact with each other, although they did like the discussions in the virtual learning environment.
A small minority of students were negative about the collaborative working arrangements, particularly in terms of assessment (e.g. the group literature review):

“group members weren’t willing to put in the effort and I feel it’s unfair that they receive the same mark as someone who has contributed more to the piece of work.” (student feedback)

This does seem to be a minority view, however, as the quantitative feedback showed most enjoyed the collaboration.

Postgraduate tutors felt that 10 minutes was insufficient time for each question; it put the students under too much time pressure. In future, therefore, only three questions (instead of five) will be included in the assessment: two dealing with which variables to include and one asking the students to generate their own question.

12. Advice to others doing a similar project

The amount of work in generating separate datasets for each topic that the postgraduate tutors wanted to study in their tutorials was considerable. The amount of time that it takes should not be underestimated. It may be best invested when the students have the opportunity to discuss the implications of their results in detail rather than when only writing up the results without discussion.

13. Further comments

Produced by CILASS (the Centre for Inquiry-based Learning in the Arts and Social Sciences), University of Sheffield, 2005-2010.