

## Incorporating authentic learning experiences in a Research Methods Course – Assessment

Discussion leader: Dr. Ben Rottman, Psychology/LRDC.

Dr. Rottman set out with three goals in mind:

- Read, interpret and understand research
- Critique research
- Design valid research that is robust to critiques

Note how these goals build on each other: e.g., in order to be able to critique research, you first must be able to understand research.

Notes about Research Methods in Psychology:

- Required in order to be admitted in the Psychology major
- 2 lectures a week and 1-2 lab per week
- When Dr. Rottman taught the course last fall, half of the students taking it were juniors,  $\frac{1}{4}$  were sophomores and  $\frac{1}{4}$  were seniors.
  - Some students put it off for a long time because they find psychology interesting, but are not necessarily interested in pursuing psychology research.

Dr. Rottman has taught this course twice so far, the first time he taught it traditionally, and the second time he redesigned the course. He firmly believes that the positive results he found when assessing the redesigned course are primarily due to the different instructional approach (and not to experience teaching the course).

The main idea behind the redesigned course is that as scientists we typically learn how to do research at lab meetings: graduate students and faculty read an article which they pick apart in a discussion. The intention was to make the Research Methods course as similar to this as possible. Also, in order to understand abstract concepts (e.g., validity), one has to understand what it means in different concrete cases. A large part of the course was focused on students being able to represent a research study schematically using causal structure diagrams (a skills that psychology researchers use on a daily basis, but students need a lot of practice). Also, it is important to keep in mind that knowledge is socially constructed and socially evaluated (e.g. peer review of research) and therefore students should themselves engage with one another in interpreting and critiquing research. The design of the course is summarized as follows:

- Students read articles and answer questions about them before coming to class.
  - Dr. Rottman used qualtrics – a free survey service which is very easy used and has some nice features, for example, student answers to questions can easily be grouped in

various ways – can look at all the answers of one student, can look at all the answers to one question (right/wrong), can look at the subset of students who answered a particular question correctly/incorrectly and their answers to a different question etc.

- Class time:
  - Small group discussion of questions answered before coming to class (~3 min)
  - Students answer the questions to the whole class
    - If Dr. Rottman expects that most students should be able to answer a question, he picks students himself
    - If the question is more challenging, he asks for volunteers
  - Whole class discussions of the questions, often focusing on research methods and research concepts (e.g., validity).
  - This discussion can easily last 20 minutes – the questions are challenging and students often offer dissenting views.
- An answer key based on student difficulties discussed or discovered in class is provided
  - There is some evidence that students find the answer keys useful (several students performed poorly on the first exam, when asked if they look at the answer keys after class said no, were encouraged to do this, started doing it and did much better on subsequent exams)
- The exams are very similar to what students do in class – students read articles at home, bring them to class and answer questions about them.
  - Students can write anything on the articles
  - They can also bring a 3x5" index card with whatever information they think would be useful.
  - Note how similar this is to what a lab meeting actually looks like
- Note that Dr. Rottman discussed the design in more detail in a previous lunch discussion – more information available [here](#)

Since the instructional approach Dr. Rottman used is significantly different from what students may expect (sit passively and listen to lectures, occasionally answering questions), in order to thwart student resistance, Dr. Rottman spent time framing the redesigned course for students.

- In the first class, the expectations were laid out for students and it was made clear that it is in general very important to be able to understand and critique scientific research, even if you are not planning on pursuing a career which involves doing research.
  - In order to be informed citizens we need to be critical of the information we are presented with on a daily basis, which often comes in the form of reports of scientific studies which purport various benefits/disadvantages to various life choices (e.g., eating yogurt, doing yoga etc.) We should not take any advice at face value and examine it critically.
- Developing the skills required to be able to critically assess research requires practice and feedback. Students practice the skills on their own and receive feedback from each other and from the instructor during class.

- In addition, Dr. Rottman motivated students to engage in discussions with one another by presenting research results on the benefits of collaborative learning.

In general, Framing an instructional intervention is very important because students should buy-in and try their best to take advantage of evidence-based teaching strategies.

Students practiced the various skills that Ben wanted them to develop at home, and had to demonstrate being able to use those skills in exams.

- For example, identifying causal relationships is an important skills and students got the chance to practice this at home and get feedback in class: in two separate sessions, students read an abstract or an introduction of an article and had to determine the appropriate causal diagram. In addition, they had to argue based on the information in the article that the causal diagram they drew is the correct one. They discussed this with peers in class and got feedback from the instructor after which they practiced the skill again in subsequent homework.
- This skill was also assessed in exams using the same approach (students read an article at home and one of the exam tasks was to determine the appropriate causal diagram).
  - One thing Dr. Rottman mentioned is that the exams were a lot easier than the homework (e.g., students did not have to come up with the causal diagram, but had to choose one from a list of four or five), but still, there are other answers that students can latch on to (incorrect answers are based on the incorrect types of reasoning which were identified during in-class discussions) and many students did latch on to them.

The important point is that the assessment style taught students to focus on underlying concepts relevant for understanding and critiquing research articles (something that psychologists do) instead of the content of those articles and the specific findings reported.

Dr. Rottman then discussed multiple examples of the kinds of skills he required students to practice at home and get feedback in class and how these skills were developed and assessed.

### Ethics of research

- Regarding this, what often happens in a research methods course is that extreme cases are discussed in which the research is completely unethical
- Instead, Ben chose to discuss current research examples which are not so clear cut
  - For example, the recent Facebook emotion study which got some press for neglecting to ask for consent from users before manipulating the news feeds of 1% of users for one week and looking at the effect on their posting
- These kinds of examples also speak more to today's students who are so accustomed to social media and get students to really engage with one another in discussions

### **Key points:**

- This approach encourages students to read research articles as deeply as possible.
  - Very important skill for students who want to pursue graduate school in psychology, but this is also important for other students who will need to be able to make informed decisions by interpreting the evidence presented to them on a daily basis.
- Students learn to support their assertions with evidence – students have to argue for their position using material from articles (“I believe that this causal diagram is the correct one, because if you look at page 376, 2<sup>nd</sup> paragraph, the authors state that...”).
- Students engage with one another in discussions about underlying concepts which the articles can be used to understand.
- The goals of the course (e.g., be able to draw causal diagrams that represent a research study’s findings and assertions) are aligned with the design of the course (students are asked to practice relevant skills – and get feedback from each other and the instructor) and are aligned with the assessment methods.
  - This instructional design is a great example of the Alignment Model in practice.

### **Assessment results**

What Dr. Rottman did to evaluate the effectiveness of the course was to compare OMET evaluations from the two times he has taught the course (once traditionally, and once using this transformed approach).

- In general, course evaluations are not necessarily a good measure of the effectiveness of a course because they are an indirect measure of learning, but the design of the course is so vastly different from the traditional one, that it is nearly impossible to formulate common questions.
  - Transformed course exam: answer questions on articles read before coming to exam focused on concepts.
  - Traditional course exam: answer general questions about concepts without reference to actual articles (perhaps with reference to fake examples usually discussed to illustrate the concepts).

One thing mentioned during the discussion about OMET surveys is that student answer to the different questions are highly correlated (i.e., students tend to answer similarly in all questions), which suggests that the surveys really measure just one construct – how much students liked the course/instructor.

One very important thing for Dr. Rottman is that students perceive the evaluation as fair. He was worried that students would not like the fact that they are asked to answer questions about research articles that they read before an exam.

- He did not see any difference between the two courses (traditional vs. transformed) in OMET evaluations

Overall he saw statistically significant improvements the following questions:

- Organization
- Course stimulates thinking
  - Very important – this is the purpose of the discussions
- Course makes good use of examples
  - Very important – this is the purpose of using real research articles
- Amount of work and amount learned
  - Expected – students had to do more outside of class, but the extra work does translate into more learning
- Overall effectiveness
- Recommend the course and recommend the instructor

Several additional questions showed that students

- Found the articles read for homework interesting
- Believed to benefit from working with other students and from the class discussions
- Felt more competent in reading research articles (important goal!)
  - This question was also asked early in the semester and even after only reading two articles (in the involved manner required for answering the homework questions), students felt more competent in reading research articles. This illustrates that the homework questions were well designed to improve their skills in understanding research articles.
- Had a clear idea on what they would be tested on.

In addition, Dr. Rottman asked students for feedback on a mid-semester survey and students offered suggestions that helped improve the course.

- For example, one common complaint was that the small group discussions were given too much time, so Dr. Rottman reduced the time to 2 minutes and spent more time on whole-class discussion

Students really appreciated the fact that the instructor took time to hear their opinion and made changes based on their feedback.

- In general, research has shown that it really doesn't matter what the change is as long as it's perceived by students as relevant

One thing discussed is that this may be different for female instructors

- Past research has shown gender bias in teaching evaluations and in general female instructors are not seen as equally competent teachers as male instructors.

- Students can interpret asking for feedback on the course differently for a female instructor than a male instructor:
  - Male: he really cares about our learning and wants to improve the design of the course
  - Female: she doesn't have her act together and needs our help to teach effectively

Dr. Rottman mentioned that this course actually changed him as an instructor and greatly improved his confidence in teaching.

Student comments – you can read common positive and negative comments in Dr. Rottman's presentation

- One common comment that prompted Dr. Rottman to change what he will do next time he teaches this course was that when sometimes students would say something in class that was completely wrong, he didn't specifically indicate it was wrong
  - In general, saying that a student is wrong directly is not a good idea, BUT, what one can do is externalize the idea (e.g., write it on the board) and move the discussion towards the correct idea, which, once arrived to, can also be written on the board and the two can be contrasted

Future considerations:

- Skills that students practice are really difficult – sometimes Dr. Rottman would get in real scientific conversations with the TA about how a concept is expressed in a particular article
- The book is very good, but it is unlikely that more than a few students read it. In the future it could be assigned to the lab section
- Students have a strong tendency to take research at face value (“this people definitely know more than me”) instead of thinking about how to critique the research
- Weak background in statistics – perhaps spend more time helping them with the basics they need for this class
- Trying to find articles that are flawed in some way so that they can actually be critiqued is extremely difficult; in addition, crafting appropriate questions (both homework and exam) is very difficult.
  - From the first implementation, he saw that certain improvements can be made on some questions, more can be crafted, more articles can be found.
- Dr. Rottman is also interested in disseminating the approach he has developed
  - The instructor currently teaching the course has been working with him on the redesigned course and is very open to using many of the materials, but instructors in the future may require some convincing

Overall it appears that the redesigned course was very successful and Dr. Rottman is planning on continuing to use this approach and also supporting faculty members in the Psychology department who

teach this course in the future to use a similar approach and/or his materials (which he will continue to develop).