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Design, implementation, and assessment of an authentic advanced undergraduate psychology research methods course

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Psychological research methods and statistics courses are an increasingly common undergraduate requirement, but are amongst the least popular classes in undergraduate curricula. This paper describes the rationale and implementation of a PSYC325 advanced-level research methods course designed to provide a 'valid' (authentic) research experience. Student researchers choose research topics and develop specific research questions, complete ethics for their project, collect and analyse data, before submitting, then revising and resubmitting, a report in journal format. I present evidence for the perceived and actual utility of the course, firstly in the form of student evaluations of important course-relevant aspects (e.g., stimulation of interest, utility of material, quality of feedback) that compare favourably with departmental norms, and secondly in the better-than-peer performance of PSYC325 alumni outperformed in subsequent research-related study.

Keywords: teaching research methods, psychology, authentic assessment

This paper describes the design rationale, implementation, and learning outcomes of an advanced undergraduate course on psychological research methods. Research methods, and the qualitative and statistical analytical tools used to evaluate the data that result, are increasingly emphasised in undergraduate psychology programmes. Ware & Brewer (1999) suggest that more than 75% of American psychology students are required to complete a methods course, research methods is a requirement for programme accreditation in Australia (Australian Psychology Accreditation Council, 2008), and a similar pattern is found in New Zealand. This reflects both the emphasis on applied psychology as an evidence-based discipline, and undergraduate psychology as the first step towards a research-based career. Not surprisingly, experience of teaching research methods is one of the most commonly described criteria in advertisements for academic psychology positions (Irons & Buskist, 2008).

In New Zealand, research methods have gone from being small and avoidable components spread across individual courses, to being complemented by (usually required) whole 'introductory' methods courses, in turn increasingly accompanied by higher-level 'advanced' methods offerings. Of the six major universities, Auckland, Canterbury, Massey, Victoria University of Wellington (VUW), and Waikato all offer research methods courses at second and third year.

While the importance of research methods teaching is more or less assumed by faculty, it is almost certainly the last thing that inspires new university entrants to study, and continue to study, psychology (Reynolds, 1977; Zablotzky, 2001). We have surveyed thousands of students in their first psychology class about the concepts, areas, and skills that they are most

looking forward to and, while a minority indicate a general interest in the content of psychological research, less than 1% mention the process or methods of carrying out that research as an anticipated highlight. On the contrary, many students are, at best, ambivalent and even anxious at the prospect of encountering the statistical content of these otherwise highly popular courses and programmes (Feldman, 1984). Even highly committed students tend to favour the content of the various sub-disciplines of psychology, and this drives their subject choice more than the methods used in those areas. The required nature, and analytical content, of research methods teaching is potentially a problem for both students and educators – required analytical courses tend to be evaluated more negatively by students than almost any other courses (Feldman, 1984; Greenwald & Gilmore, 1997; Neath, 1996).

It should be clear, then, that there are numerous challenges to the provision of methods teaching. Educators tend to be fully aware, if not fearful, of these concerns. To assist in this endeavour there are increasingly more resources and sources of guidance available. As well as texts applicable broadly to the teaching of behavioural and social sciences (e.g., Dunn, Smith, and Beins' (2007) *Best Practices for Teaching Statistics and Research Methods in the Behavioral Sciences*), there are sources specific to Psychology (e.g., Saville's (2008) *Guide to Teaching Research Methods in Psychology*).

Towards a 'valid' methods course

In 2003, the School of Psychology at VUW introduced a third year undergraduate course PSYC325 'Advanced Research Methods in Psychology', intended to follow logically from the second year (pre-requisite) introduction to research methods, and conceived as preparation particularly for those contemplating further postgraduate study in psychology. As something of a service course it was decided that four common methodological (and common analytic accompaniments) would be covered in this course: psychological measurement and psychometrics, survey research and multiple regression, complex experimentation and MANOVA, and discourse. For the purposes of this paper, the content is secondary to the broader assessment and experiential framework in which it was embedded.

Among the important principles that guided the design of the course were the following:

- Engagement: Bearing in mind the common misgivings held towards courses of this type, and that psychology students are often committed to the content of some sub-disciplinary areas more than others (and certainly more than methods), a priority was to make the course engaging to students with various interests as well as engaging them in the research process.
- Validity of the learning experience and the assessment of it: A foundational issue in psychological research concerns the measurement of psychological constructs being researched. That is to say, a psychological measurement instrument should measure that which it purports to measure – that it is valid. Specifically, it was important that this course provide a valid learning experience (it should prepare students well for their subsequent research-based endeavours) and be assessed validly. In this learning and teaching context, 'valid' essentially corresponds with authenticity of the learning experience so this term will be used where appropriate to avoid confusion.

In essence, the major piece of course assessment (a 4,000 word APA format research report associated with 60% of the course mark) was presented as a microcosm of the full research experience – from research design and ethical approval through data collection and analysis,

write-up and submission to a journal for consideration. This process is described in detail below.

At the start of the course, it was explicitly stated that one of the aims of the course was to encourage students to move from the role of passive recipient of research skills to active researcher. For this reason, they would not (as is common) be both the subjects of the research they were asked to investigate, but also the investigators. They would collect ‘real’ data from ‘real’ participants. In order to address a diversity of interests (to engage as many students as possible), student researchers were given up to 25 different research questions to choose from at the start of the course. These included research questions that were clinically related, social psychological, developmental, neuropsychological, and criminological to name only a few (example starter questions are presented in Table 1). Each of these research questions were addressed using data that the researchers themselves collected (under supervision) using first-year subject pool participants. Each pre-prepared project was included within a single wide-ranging ethics application passed by the VUW ethics committee for the purposes of teaching and research prior to the course start. Example research questions are provided in Table 1. One model for methods courses is the use of student-driven research projects (Marek, Christopher & Walker, 2004) in which researchers develop their own research questions to test. While this maximises ownership and relevance of the work for the researchers involved, it can be difficult to implement within some human ethics frameworks because of the need for time-critical approval, and is usually developed within fairly rigid parameters (e.g., the scope and nature of projects is somewhat circumscribed). The model adopted in PSYC325 was a compromise designed pragmatically to allow an authentic research experience within a 15-week course. Once settled upon a topic and after a series of lectures and tutorials on the theory and practicalities of ethical approval and the ethical obligations of the researcher, the student researchers (or in the case of projects selected by several, groups of researchers) were given a starter pack of journal papers and resources with which to refine their research questions, and to serve as the basis of the (hypothetical) ethics application for their project (assessment 1).

Table 1: Example initial research questions

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- Is endorsement of smacking as parental discipline associated with general aggression?
 - Is psychopathology associated with belief in the supernatural?
 - What are the cognitive correlates of handedness?
 - Does testosterone production predict psychological gender attributes?
 - What does musical taste say about personality?
 - Is psychopathy immoral or amoral?
-

Researchers signed up to collect data in pairs (one to introduce and one to debrief participants) for an hour each under the supervision of teaching staff. They were then guided (in laboratory session) through SPSS entry of their data, which was then aggregated with other researchers’ data and cleaned for use. Researchers were encouraged to be creative with their specific hypotheses and in their approach to data analysis, and to make use of whatever analytical tools were most appropriate in addressing them. The one proviso was that researchers must use at least two of the primary analytic strategies presented in the course lectures, and illustrated in laboratories (e.g., factor analysis of a psychological instrument AND multiple regression). Throughout the course, researchers practiced analysis of research questions similar to their own with appropriate data in laboratory classes. Outside of these timetabled sessions, the laboratory itself was scheduled to be available for an additional 10 hours per week for researchers to work on their projects at their own convenience.

The draft report (worth 45% of the course mark) was to be submitted anywhere up to 10 weeks into the course (though practically, most researchers did so after week eight), along with a self-assessment of their report informed by the marking rubric to be used. Researchers were given this assessment window during which to submit their draft to allow them to regulate their time and output within a finite period and around their assessment for other courses. One consequence of adopting validity/authenticity as a criterion for assessment and learning is that one is obliged to provide as much opportunity as possible for assessment to reflect the actual quality of work, rather than situational factors that might come in to play. In return for researchers committing themselves to their work, staff made a commitment to them to return drafts with extensive feedback (both throughout the draft itself as well as in the form of a journal review-like summary) no more than a week after submission. Specific feedback was given to address particular concerns researchers identified with their work in the self-assessment, and researchers were debriefed in lectures about common concerns and the next step in the process.

Upon return of the draft report, researchers were invited to revise and resubmit their work in the light of the 'review' they had received for a further 15% (at VUW, group work cannot exceed 15% of the course mark). Re-submission was to occur within one week of the end of the course, and be accompanied by a cover letter detailing how the reviews had been addressed. All researchers working on the same research question were emailed and invited to meet with the coordinator to discuss working on a group report to be submitted for review to a psychological journal if they wished. Approximately half of the researchers decided to proceed with a group submission, and were mentored through that process by course staff. Of these, only a minority opted to submit their report to a journal. The remaining researchers opted to revise their report as an individual submission. Regardless, all revisions were re-marked using the same rubric.

As well as mirroring a realistic research process of submission and revision, this format encouraged researchers to benefit from feedback on their work – in order to include a cover letter describing revisions undertaken, researchers had to first read that feedback and address it. Resubmission of the report with a cover letter makes feedback on the initial submission *consequential* (Orrell, 2006) – students cannot gain the additional 15% unless they read the feedback, revise their report and describe how/why it was/n't revised. The draft becomes a piece of formative (rather than solely summative) assessment, and there are no more piles of uncollected assignments at the end of the course!

The remaining 40% of the course mark came from a hands-on transcription exercise (10%), test (20%) and the ethics assignment (10%).

Course and student outcomes

Several indices might be use to assess course success. These include formal and informal evaluations of the course made by students, students' performance in the course, as well as assessment of any ongoing effects of exposure to the course.

Course evaluations

How did students react to the course? Table 2 presents the average course evaluations for PSYC325 alongside overall average evaluations for the other combined 300-level psychology courses offered at the same time. Though statistical analysis is not possible based on the summaries provided to academic staff, it is apparent that PSYC325 has lower (and therefore more desirable) evaluations on all dimensions and a workload judged as closer to 'about right' than the departmental average. Importantly in relation to the rationale of the course, the perceived utility of feedback (1.8 vs. School average 2.5), Stimulation of interest (2.2 vs. 2.8), utility of course material (1.5 vs. 2.0) and overall course quality (1.9 vs. 2.8) were all at least .5 better than department norms. Given that, as noted, students are initially motivated primarily by interest in psychological course content rather than method it is something of a triumph that the course is seen as more stimulating than more than their other content courses.

Table 2. Comparison of average PSYC325 course evaluations with departmental norms

	PSYC325 Mean evaluation	Overall mean evaluation for all 300-level PSYC courses
Course organisation assisted my learning	1.8	2.5
Clarity of communication of important course information	1.9	3.2
Feedback assisted my learning	1.8	2.5
Workload	2.6	2.2
Course stimulated my interest	2.2	2.8
Material will be useful to me	1.5	2.0
Overall standard of teaching	1.9	2.8

Note: All by workload (much too much, to much too little) are assessed on a 1–5 scale where 1=strongly agree/outstanding, 3 is neutral/satisfactory, and 5=strongly disagree/very poor.

Student feedback

Students are encouraged throughout the course to provide feedback about concerns (and triumphs) as well as providing formal qualitative feedback at the end of the course. Each course has at least one student representative (and in most years, each lab group) to act as points of contact, and who met bi-weekly with the coordinator. Blackboard forums for students were established and monitored, and as I was also a 'tutor' in at least one lab group, there were numerous opportunities provided. One-minute papers were invited bi-weekly, and a suggestion box used in some years. Feedback typically supported exactly the strengths identified in the course evaluations. Around 20% of end-of-course feedback was positive about the nature and responsiveness of feedback, with a further third of students identifying the variety and realism of assessment as one of the three best aspects of the course. A smaller percentage (17%) liked the collaborative aspect of working together with fellow students in laboratories and on assessment. The most common negative was the expected workload – though as illustrated by the course evaluation data above, this appears to be a criticism of workload as relatively greater than other courses in the programme as it was rated (on average) as slightly less than 'about right'. Informally, though many students enjoyed the flexibility of topic choice and final research strategy, each cohort has included several students who found this quite anxiety-provoking. Specifically, the choice and flexibility (though perhaps more consistent with the expectations of an Honours thesis) was dramatically different from the canned and pre-destined, student as both researcher and researched, assessment projects of other undergraduate psychology courses. An awareness of this as an issue has allowed it to be addressed earlier in the research and mentoring process.

Student achievement

Average course grades for PSYC325 have typically varied around, but close to, the departmental final year average of a 'B' (65–70%) with a stable 10% of students receiving either A-grades (overall course mark of 75% and above) or non-passing grades (course mark less than 50%), but grades cannot (in themselves) be taken as evidence for success of course design. Assessing learning outcomes is a difficult issue, but in this case the very course rationale points to one index of success to complement the standard course evaluations used by most institutions – student achievement in subsequent research-related study.

Between 2003 and 2007, 324 students (an average of 65 per year) took PSYC325. From 2004 to 2008, 157 students completed Honours theses as part of their postgraduate study in psychology. 73 of these had studied in PSYC325 (between 2003 and 2007), 57 had been undergraduate students at VUW but had not taken PSYC325, and a further 27 had completed their undergraduate qualifications at universities other than VUW.

In order to assess the impact of PSYC325 participation on Honours thesis performance, a dataset was constructed based on student records information. This dataset included PSYC325 participation (yes, no, or non-VUW undergraduate), Honours thesis grade (converted to grade point: A+=10, A=9, A-=8, and so on), and final undergraduate year grades (converted to grade points) from which a final undergraduate year Grade Point Average (GPA) was calculated. Figure 1 represents the mean honours thesis result for the three groups of students – VUW students who had taken PSYC325, VUW students who had not taken PSYC325, and non-VUW undergraduates. A one-way ANOVA, followed by post-hoc Tukey tests ($p < .05$) indicated that PSYC325 alumni (Mean thesis grade point=8.56, or halfway between an A- and an A) performed significantly better than either VUW students who had not taken PSYC325 (Mean thesis grade point=7.61, or halfway between an B+ and an A-) and non-VUW undergraduates (Mean thesis grade point=7.56; $F(2,154)=9.50$, $p < .001$, $\eta^2 = .11$) though there was no significant difference between the latter two. This indicates that PSYC325 alumni tended to receive, on average, one grade (or about 5%) higher than students who had not taken the course.

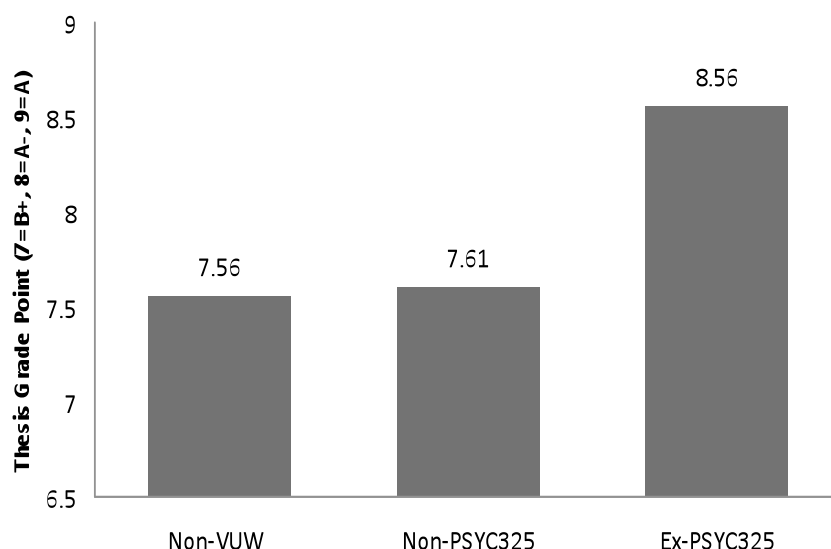


Figure 1: Mean Honours thesis grade point for non-VUW undergraduate students, VUW non-PSYC325 students, and PSYC325 students

At the same time, it might be argued that, given the non-compulsory but stereotypically unfriendly nature of PSYC325, those students who voluntarily take the course might be atypical of psychology students in general. Indeed, it is reasonable to suspect that the ‘better’ students, and those intending to proceed to postgraduate study, might tend towards PSYC325 more than other students. This notion is lent support by the strong relationship between final year GPA and PSYC325 grade, as evidenced by a Pearson’s correlation of $r(70)=.61$, $p<.001$, for those students in the dataset. For this reason, final year GPA was entered as a covariate in an Analysis of Covariance comparing PSYC325 alumni with VUW non-PSYC325 students. If the better students tend to get better grades for their Honours thesis, then participation in PSYC325 might make no difference.

The subsequent ANCOVA however, though indicating that final year GPA was a significant predictor of Honours thesis outcome ($F(1,127)=32.31$, $p<.001$, $\eta=.20$), confirmed that PSYC325 participation was reflected in a significant difference in outcome across the two VUW groups (no student records data was available on the prior academic performance of students entering from other universities) even after taking into account GPA ($F(1,127)=32.31$, $p<.001$, $\eta=.08$). This suggests that those students who took PSYC325 performed better in their theses than would be explained by prior academic achievement alone – that PSYC325 has had a beneficial impact on exactly the performance it was designed to enhance. Indeed, a 2005 independent curriculum review received submissions from students stating that Advanced Research Methods should be a pre-requisite for postgraduate psychology study.

Summary and conclusions

PSYC325 has been developed to represent as current as possible best practice in the teaching of research methods – though there is relatively little literature that addresses this specifically in the area of psychology. The course is designed around the foundation of experiential and (bounded) inquiry based learning – that is to say students are active participants in their learning and have considerable flexibility around the nature of the questions that they choose to learn around (National Research Council, 1996). The course models not just the importance of validity (through an authentic learning experience) as a foundational concept in psychological science, but also the actual research process as closely as is possible in a single trimester. In so doing, we have aimed to “set tasks that mimic realistic problems whenever possible” (Ramsden, 2003, p.204).

The results presented above suggest that there is reason to think that the course has been at least a partial success in relation to the principles upon which it has been developed, and the aims it has been developed to achieve. Specifically, particular effort has been devoted to trying to engage students in learning a topic for which their primary motivation is predominantly extrinsic (they have to do it), and in the research process itself. Providing a range of relevant, realistic, and legitimate research questions allows students to practice their skills within the context of the disciplinary areas in which they are intrinsically interested. As well as mirroring a ‘real’ research experience from concept to article submission, the submission followed by revision-format makes feedback formative and consequential. That this has been successful is illustrated by student evaluations of the course as stimulating. That the course achieves its aims of providing useful skills, and of preparing students for subsequent research, is supported both by course evaluations of the utility of course material but, more importantly, in students’ actual ongoing research performance.

While this is clearly what we hope might be the case, it will obviously not apply to all students, and it has not been possible (in the absence of other potentially important student factors) to investigate whether success is moderated by other ‘variables’. Similarly, it may be the case that PSYC325 students share other learning experiences outside of the course that explains to whatever extent their apparently better subsequent learning outcome. For example, other scientific disciplines include research-relevant experience that might synergise or entirely explain this difference.

At the same time, in a relatively large class it was clear that the teaching model was disturbing to some students. Though students were much more likely to comment that they liked the differences (and the autonomy) of PSYC325 compared to their other experiences, it was clear that some students found this anxiety provoking. Additionally, workload was not just an issue for students. Pre-course organisation is considerable, in order to prepare projects and materials, seek ethics approval, etc. The commitment to ensure timely and detailed individual feedback requires effort and time. This is not an easy issue to address, but might possibly be mitigated by ensuring an appropriate level of resourcing for sub-lecturer support, spreading feedback provision across academic staff not otherwise directly involved in the course, or by assessments that ensure those involved do not receive an inequitable workload compared to other (non-involved) colleagues.

The results reported above provide a window on some of the positive outcomes for some of the PSYC325 alumni, but those students continuing to higher-level study are still in the minority. More than two thirds of students did *not* continue to postgraduate psychology at VUW, though 20% of those non-continuing students would have been eligible (on GPA) to do so. A more complete picture might be obtained by tracking this cohort into whatever careers replace their study. Though not without its issues, this preliminary analysis is at least encouraging that the endeavour has been worthwhile.

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