CREATING INDEPENDENT RESEARCHERS
Curriculum design for undergraduate research methods and statistics

QUICK TIPS AND POINTS FOR FURTHER DISCUSSION

Creating Independent Researchers: curriculum design for undergraduate research methods and statistics, a one-day event hosted by Royal Holloway University of London and supported by Oxford University Press, provided the perfect opportunity for psychology academics from around the UK to come together to discuss the many challenges they face in delivering the subject.

Ideas for best practice in the design and delivery of research methods and statistical analysis courses were shared, and we are delighted to present these here for your information and use.

Read on for quick tips and discussion points to inform your teaching and to help you transform your undergraduates from anxious students to independent researchers.

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“The whole day reinforced why I love teaching statistics - I managed to develop new ideas, stimulate my reading around the subject starting with some references provided, and networked with others who were just as keen to teach stats as I am.”
Roz Collings, University of Northampton

“A wonderful opportunity to network with stats and methods teachers to gain an insight into things that work and don’t work.”
Marc Baker, University of Portsmouth

“Thanks for this event - a great opportunity to meet others and to discuss, compare and contrast approaches. It was also very gratifying to hear the niggles and issues raised by others and to know that we are not alone in having to handle some of the issues that seem to be inherent in teaching this subject currently!”
Julia Robertson, Buckinghamshire New University

“A fantastic event that I hope is only the start of something with some legs that will help support and advocate for innovative stats and research methods teaching across the UK HE sector.”
Rev Dr Alasdair Gordon-Finlayson, University of Northampton
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QUICK TIPS AND POINTS FOR FURTHER DISCUSSION

1. DESIGNING A CURRICULUM FOR THE ENTIRE DEGREE

Quick tips

• Agree on text/texts in use across RM and stats modules to ensure consistency.

• Hold team meetings – horizontally and vertically – to ensure that RM and stats teaching is as joined up as it can be across and between the years of study. Try to create a structured progression with minimal gaps and only planned, not random, repetition.

• Ensure consistency across modules re learning outcomes, structure and the terminology you use.

• Present your students with an overview of everything that they will be learning at the outset: tell them the full story and explain where your teaching fits in – this can be done really briefly.

Points for discussion

• Consider having one person with responsibility for, and oversight of, all stats and RM teaching.

   **Advantages**
   • They can ensure a structured progression through the RM and stats teaching, and liaise with module co-ordinators on the subject specific modules, ensuring consistency across and between years of study and minimising unnecessary repetition;
   
   • They can act as a specialist, taking the responsibility for staying up to date with research methods pedagogical research/best practice;
   
   • They are a very visible point person for both staff and students.

   **Disadvantages**
   • There can be resistance to having one person in this role;
   
   • The administrative burden can be high;
   
   • That person needs to make sure that they can still delegate;

   • The variety of expertise/perspectives could be diminished somewhat, and could lead to a dogmatic approach and inflexibility;

   • Their expertise leaves with them.

• Discuss when and how you will introduce non-parametric analysis, and the balance you will give between parametric and non-parametric analysis.

• Consider how many credits your RM and stats modules bear, and how this impacts on student perceptions of importance, and engagement.
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QUICK TIPS AND POINTS FOR FURTHER DISCUSSION

• Have you considered introducing an advanced stats module in year 3 to build student confidence and capabilities before the research project?

• How far do you critique NHST, and how far should you go in exploring the alternatives e.g. effect size, confidence intervals? Are all of your staff up to date on alternatives to NHST?

• Where do you cover qualitative research methods in your curriculum, and why?

• Agree what skills, knowledge and attributes your students should have by the time they come to completing their final year project, and ensure learning outcomes for your preceding RM and stats modules map to the development of these skills, knowledge and attributes.

   Things to consider might be:
   - How to research and critique the literature;
   - Writing skills;
   - Verbal communication skills;
   - The ability to work independently;
   - An understanding of research design – how it fits in, and why it’s important;
   - An appreciation of the different research methodologies and when you should use them;
   - Statistics knowledge – how to analyse the data, and how to interpret the data;
   - SPSS literacy;
   - Confidence.
2. METHODOLOGY AND ANALYSIS: INTEGRATE OR SEPARATE?

Quick tips

• Make your introduction to the subject as gentle as possible – start with research design and interpretation first, then build up the whole story.

• Co-ordinate with other lecturers to ensure different modules/assessments are aligned i.e. so stats teaching and/or lab classes/reports progress in line with what students have learned about research design and methods from any other RM modules as well as their subject specific modules.

Points for discussion

• Does it make sense to have the same person/team teaching both RM and stats?

• What do you introduce first, RM or statistics? Our delegates unanimously agreed that covering stats before methods would present real difficulties.
  - RM first allows you to set up a real-world problem first, and then go through the research process step-by-step, putting stats in their proper context i.e. that the research question always comes first;
  - Stats first could intimidate students, especially if they have any maths anxiety;
  - Could putting stats first, without discussing the wider context, affect retention rates on your course?

• Can you ever successfully embed RM and stats teaching in subject specific modules?
  - Can have real pedagogical benefits BUT
  - Co-ordination across modules becomes even more important, and yet more challenging- there are more of them, and module leaders may have different priorities. It is a lot of work!
  - You need agreement of and control over the stats that appear in the different subject-specific lab reports;
  - There can be major timetabling issues;
  - There can be issues around staff enthusiasm for, and competency in, RM and stats.
Quick tips

- In modules where you use a software package, remember that there are usability issues and there are statistical issues: you have to address the first before you can address the second: sometimes, students worry about using SPSS more than they worry about using the stats themselves.

- Make it clear to students that SPSS is a tool that will help you analyse the data you have gathered to answer your research question: it is a time saving tool, not a learning outcome in its own right.

- If students have a lack of theoretical maths background, have you considered using podcasts to help them fill in the gaps?

- Are your students happy to engage with unfamiliar software packages? Don’t assume that they are, and consider factoring ways to counter any anxieties about new programmes into your module planning.
  - Consider building on the visibility of psych technicians to help and offering drop-in sessions to build confidence: perhaps linking in with any university-level provision if you don’t already;
  - Have you considered using screencasts or YouTube videos to introduce students to the software?

- Space for computers and lab timetabling can be an issue:
  - You could try Twitter sessions for when students are using SPSS outside the lab/at home: create a hashtag to enable them to join the conversation;
  - Make sure you provide plenty of SPSS worksheets on your VLE for students to use to practice with outside the classroom;
  - would using hand calculations in your teaching help alleviate the pressure?

- You can use the computerised nature of software packages to do things that by-hand cannot accomplish in the same way e.g. changing data points and demonstrating in real-time the effect this has on results.

- Do you tie SPSS capability to employability?

- Do you tie maths skills (hand calculations) to employability?

- Whether using SPSS or hand calculations to teach statistical analysis, be sure the give plenty of examples of when to use the different tests in your teaching.

Points for discussion

- How are students going to engage with SPSS? Think about lab provision and/or use of own or institutional devices.
Do your students have issues with maths anxiety/stats confidence? Don’t discount hand calculations as a way around this: SPSS helps with the step-by-step mechanics of the calculations but can be a bit of a black box conceptually, while hand calculations can give students the opportunity to get to grips with the statistical concepts.

One of the problems with jumping straight into SPSS is that if it goes wrong, students don’t always know enough about the underlying concepts to know why.

Have you considered using SPSS and hand calculations side-by-side? For example you could teach students on each given test serially, one session covering both by-hand and by SPSS. You could think about organizing your module around the four Cs: concepts, calculations (by hand), computations (SPSS), competencies (and confidence!) or concepts, calculations (by hand), computations (SPSS), confidence intervals!

Do you use excel? R?
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Quick Tips and Points for Further Discussion

4. Assessing Research Skills

Quick tips

• Give students an opportunity to get to grips with the process as a whole right at the outset:
  - Get students to find a piece of research, summarise it, find a study that cites it, explain how the new paper is relevant; then find a paper that hasn’t been cited and explain its relevance.

• Weekly MCQ test:
  - Helps lecturers and students to spot issues – can build confidence and aid retention of knowledge, and students!
  - Consider making these count toward the degree;
  - Could pull in random questions from earlier tests to ensure revision and spot any attendance issues.

• Check students are “getting it” when it comes to research:
  - Create an assessment which encourages students to look at the research process as a whole, and which does not just look at RM or stats, but both together. “Why is RM a good thing/important” will be a key issue;
  - Get students to weigh up the pros and cons of quants and quals;
  - Get students to do a 1000 word critical analysis of a study e.g. the MMR/autism study, and then a 1000 word piece on how they would re-design the study; you could split this over the course of a semester/year, so that they can use the skills they learn over the course of the module.

• Early in the degree programme, consider giving students a taste of the “real” research experience in a scaffolded way:
  - You could offer an approved set of mini-projects, perhaps with the research design implicit in the instructions. You can then provide approved solutions afterwards;
  - Or perhaps consider providing them with a partially designed study to complete – you could incorporate e.g. an ethics element;
  - You could include a presentation element in the assessment.

• To give students the fullest experience of doing “real” research:
  - Give them an assessment which builds in research design and ethics components as well as statistical analysis – great preparation for final year project work – perhaps more of a year 2 assessment;
  - You could provide predefined questions and again provide approved solutions;
  - Again, you could include a presentation element in the assessment.

• If you’re doing a computer based SPSS assessment, make sure it’s set in the wider RM and stats context – don’t just use it to test data analysis skills. Give them a dataset and a research question, and consider setting a number of short-answer questions:
  - Get students to explain the hypothesis chosen;
  - Get students to identify and explain the variables;
  - Get students to justify the test they’re using, with reference to the research design and levels of measurement etc.;
  - Get them to describe and interpret the results.
• Interpretation of results is missing from a lot of assessment – if your students are producing lab reports where their introduction is simply the same as the results section, this is causing a problem for you, so ensure you include an element to assess interpretation skills.

• Add in critical thinking questions.

• Ask them to abstract their results in 2 bullet points, a tweet, a one-minute podcast, a press release, or even a visual abstract: condensing material right down really demonstrates understanding.

Points for discussion

• Consider whether, at any point in the programme, you might create an assessment that involves presenting students with data and questions only, and “no” guidance on what analysis to use - i.e. no ‘recipe-book’ style support.
  - Could help to develop them as independent researchers BUT
  - You would need to ensure students had been given sufficient grounding in the stats to enable them to do this, or it could be damaging/demotivating.

• Have you considered incorporating peer assessment?
  - Can engage students and help develop their skills in critique BUT
  - Beware of the effects of student competition;
  - Give students clear guidance on the assessment criteria, and how the feedback should be presented.

• Consider beefing up your institution’s broader skills offering: technical skills, software skills, study skills.
5. ALLEVIATING ANXIETY AND PROMOTING THE RELEVANCE OF RESEARCH SKILLS

Quick tips

• Get students started intensively on RM and stats from day one – take a “bootcamp” approach to give them a set of tools and approaches that underpin all major findings in research. Gets them in the right frame of mind to absorb the information.

• Get students to complete a quick self-test so that they can see how their maths knowledge maps to the maths they need for psychology (this should be very basic and the relevance of these different areas of maths for Psychology should be explained).

• Use your tutee sessions to unpack how your students feel about statistics.

• Talk to them about fixed and growth mindsets (Dweck): encourage students to see abilities as mutable, developable, flexible.

• Make it clear to students that no piece of research is perfect!

• Capture their initial excitement and set up your early lab classes around things students have an opinion about – what about conspiracy theories? Current news stories? Perhaps you could take a science paper, and then find a newspaper report on it for students to critique. It’s tangible and starts to build abstract critical thinking skills that they can transfer to anything they critique. Make it clear that argument is healthy!

• Get your students to design their own learning support plan.

• Tell new students about the student psychology society before they arrive so that they can join up before they arrive on campus: psych socs are often really helpful support groups and might provide their own discussion forums.

• Have you considered a PAL scheme (peer-assisted learning)?
  - Consider getting year 2 students involved in offering timetabled support to year 1 students – create incentives for both for engaging.

• Personalise staff from the start – build links between students and research methods/stats staff (especially module lecturers and lab tutors) in Freshers’ Week.
  - If possible, maintaining continuity of tutor relationships can be very beneficial to students.

• Ensure they see the relevance/give them a selling point.
  - Research is the backbone of psychology and the wider world;
  - Importance of real-world applications;
  - One quick tip “this is the module that will get you a job”.

Back to main menu
Beware of creating anxiety, and don’t stress statistics anxiety to the extent that you are not allowing other issues to come through.

**Points for discussion**

- How do you identify struggling students?
  - On-going assessment and support to track who might be “disappearing”? Or is there something counterintuitive about countering anxiety with continuous assessment?
  - How do you differentiate between those who don’t care, and those who have genuine anxieties?

- Do you encourage students to help one another through discussion forums?
  - How do you enable anxious students to ask questions?
  - Are your students happy with peer expertise?
  - How do you prevent forums becoming “crucibles of angst”?
  - How involved are academic staff?