Teaching reproducible research: a Croatian perspective

Ivan Buljan, PhD
Faculty of Humanities and Social Sciences
Split, Croatia
Croatian Reproducibility and Integrity Network

Content

00

- Formal (structured) teaching

  Methods

  Results

- Informal (unstructured) teaching

Introduction

01

- Previous experiences: Medical students do not have comprehensive methods knowledge and knowledge remains at lower learning levels (Buljan et al, 2021)
- Psychology program: more intensive program related to methods and data
- The aims:

  Highly developed critical thinking

  Methods knowledge attained on higher cognitive levels

  Transfer of thinking to practical areas of future profession

Current issues in teaching reproducibilit

02

- Not part of traditional curriculum in research methods and statistics (explicitly) so new approaches must be developed
- Tight schedule, narrow space for development during formal teaching
- New concepts, still in development
- Student motivation
- (Still) unclear expected outcomes

Formal teaching: methods courses

03

- Lectures on common topics (study design, literature search, research biases, pre-registration, research synthesis- meta analysis)
- Practical exercises (defining research aim, recognizing studies, literature search)
- *Protocol development as course project* (modified Open Science Framework pre-registration guidance, senior students available for consultations)
- Practicals: *Group research project*, under strong guidance (group schedule is random, mandatory protocol writing and ethics approval, data collection, analysis and presentation)

  Currently two student research papers in development (data sharing is mandatory)

Formal teaching: statistics courses

04

- Common topics in descriptive and inferential statistics
- Strong emphasis on application using R programming language
- Focus on re-use of the datasets from other studies in teaching
- Code sharing is mandatory in all statistics courses
- During second year, students need to write around 14-16 reports

  Collect the data, search the literature, analyse the data and write the report

Formal teaching: future plans

05

- An elective course: more theoretical aspects of reproducibility
- Again: pre-registration project OR research project
- Focus on how to make Bachelor's final thesis more reproducible (discussions)
- After R: simpler software is easy to learn: students are more motivated to do statistics

Formal teaching: Lessons learned

06

- Teaching pre-registration from beginning needs to be monitored for effects
- Research protocols help put lessons in context
- Research project needs strong supervision (more suitable for senior years)
- Students had positive reactions about problem based teaching
- Peer to peer learning is motivating for students
- How much reproducibility is needed for students who are not interested in research?

Informal teaching

07

- Some students are more motivated than the others…
- In the beginning usually do not have much knowledge about the topic
- The (potential) optimal method: learning by doing
- Therefore: inclusion of students as collaborators on research projects (from the protocol development stage)
- Assessment needed: student's interests, previous behavior
- Students must earn authorship: gifted authorship would possibly produce opposite effect from the desired

Informal teaching: issues

08

- Not very knowledgeable in the beginning, narrow scope of activities (transcription, data collection, searching databases, data extraction)
- Patience needed; clear deadlines with clear outcomes (which are often prolonged)
- Always a possibility for them to lose interest
- Not suitable for all students

Informal teaching: benefits

09

- If the study is done properly: students given an overview on full process (from pre-registration to data sharing)
- Successful projects should be visible and serve as the motivation to others
- Student's interest is great (50% group)
- Learn fast, which expands the scope of skills
- Primacy effect

Reference

08

Buljan, I.,Marušić, M., Tokalić, R., Viđak, M., Peričić, T. P., Hren, D., & Marušić, A. (2021). Cognitive levels in testing knowledge in evidence-based medicine: a cross sectional study. *BMC medical education*, *21*(1), 25.

Thank you for your attention!

Questions?