



Teaching Reproducible Data Analysis in R: Practicalities

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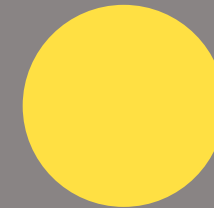
Introducing R has been part of other developments.

Curriculum developments and wider school development in statistics.

Closer links between teaching and research streams

Started about 3 years before the introduction of R

LEARNING FROM OUR STORY





What do you need to plan
for when changing to R

- Pedagogical Approach
- Assessment
- Teacher skills not related to R
- Classroom set-up
- Open minds

Pedagogical Approach in Practice

- Slowing down the pace of teaching
 - Focussing on understanding data, visualisation and probability before moving to statistics
 - Re-orient to focus on the goal
- Student generated content
 - When students solve problems things happen that you are not prepared for
 - We are increasingly finding that we have to do away with “the right answer”
- Using content not generated by us
 - Facilitators rather than dictators



Bottom-up vs
top-down
teaching

Open
educational
practices

Problem-
based
learning

Blended
learning

Pedagogical
Approach

Support materials

- What had worked well
 - R-videos we made and found on the web
 - Exercises and classes we authored
 - Data available on the web
- What has worked less well
 - Non tidyverse materials can only take us so far
 - Passive exercises – active works best
 - Most materials are not currently geared to teaching beginners
 - Most introductory materials are focussed on stats with less focus on data skills



Formative &
peer marked

Regular
exercises

Opportunities
to practice
skills

Reports

Assessment

Assessment what we have tried

- Formative
 - submissions for peer review on Slack
 - web exercises with webex
 - different levels of formative tasks (beginner, intermediate, advanced)
 - R-analysis plans for reports for peer review
- Summative
 - Weekly exercises marked with assessor (UG)
 - Problems to solve, practice with skills
 - Exercises not marked with assessor (PG)
 - Problem – based approaches: generate and analyse a hypotheses for a previously unseen dataset/dataset generated by students
 - In-class exams – similar to weekly exercises, but under exam conditions



Patience

IT support

Communication

Reports

Teacher Skills
not Related to
R

The most challenging things for students to learn



- Challenges:
 - Using computers
 - Downloading and saving files on their own computers
 - Finding files on their own computers
 - Setting the working directory
 - Uploading the correct file for an assessment
 - Spotting typing errors
- Solutions
 - Patience and lots of it
 - Sharing data/markdown/scripts as zipped (though leads to the unzipping challenge)
 - R-server (but that has its own challenges)
 - Getting R on our student desktop, but encouraging students to use their own devices



Group-based
Learning

Add some
non-R stuff

Small Groups-
teaching?

Flipped
classes

Classroom
set-up

Integration in an RM Curriculum



- Teaching about reproducibility and open science
- Encouraging discussion about research design and the nature of data
- Improving inference
- Using simulation
- Power, effect size, probability



Other things R
has done for
us

The amazing
results for our
students

Aha!
Eureka!

Made us a
team – staff
and students

Open minds