



University  
of Glasgow

# An innovative practical approach to research methods teaching addressing the open-science debate

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**INSPIRING  
PEOPLE**



- Large class size
- 2016-17 = ~ 550
- Teaching rankings – top 20 UK and top 50 global tables
- REF – 44% of research classed as world-leading
- Diverse student body – 15% classed as non-white, 30% as European/International
- 23% of our students come from the 40% most deprived postcodes in Scotland

# Time to rethink our approach

- Student feedback suggested repetition between years
- Staff feedback suggested limited understanding of key concepts
- Call for us to review our level 1 teaching of research methods
- Integrate free and open source data analysis software
- Innovation is key – take a wider view of skills
- Research led teaching – play to strengths



# Consistency

- Student feedback suggested repetition between years
  - Pre-honours was focused on inferential statistics
  - Covered basic statistics in both years > repetition
  - Needed explicit skill development over semester and year
  - All labs composed of 3 themes:

Data

Portfolio

Communication/Interpretation



# R Studio – open access analysis

- Move away from inferential statistics
- Data management and visualisation
- Realistic data rather than canned and tidy
- Focus on becoming confident and competent with data

```
# load add-on packages
library(dplyr)
library(ggplot2)

# define custom functions
cumulativeToTarget <- function(x) {
  sessID <- x$SessionID[1]
  # etc... do some other stuff
  return(res)
}

## SCRIPT BEGINS HERE
load(file = "pog.RData")

pog2 <- pog %>% filter(ms >= -200 & ms <= 1000) %>%
  filter(FrameID <= 600) %>%
  select(-ms) %>%
  do(cumulativeToTarget(.)) %>%
  ungroup %>%
  mutate(ms = (FrameID-1) * 2 - 200, ID = factor(ID))

save(pog2, file = "pog2.RData")
```

# Individual work to group activities

- Group work dominated labs from first class
- Working through tasks with peers
- Moved away from quiet labs with students working on tasks individually







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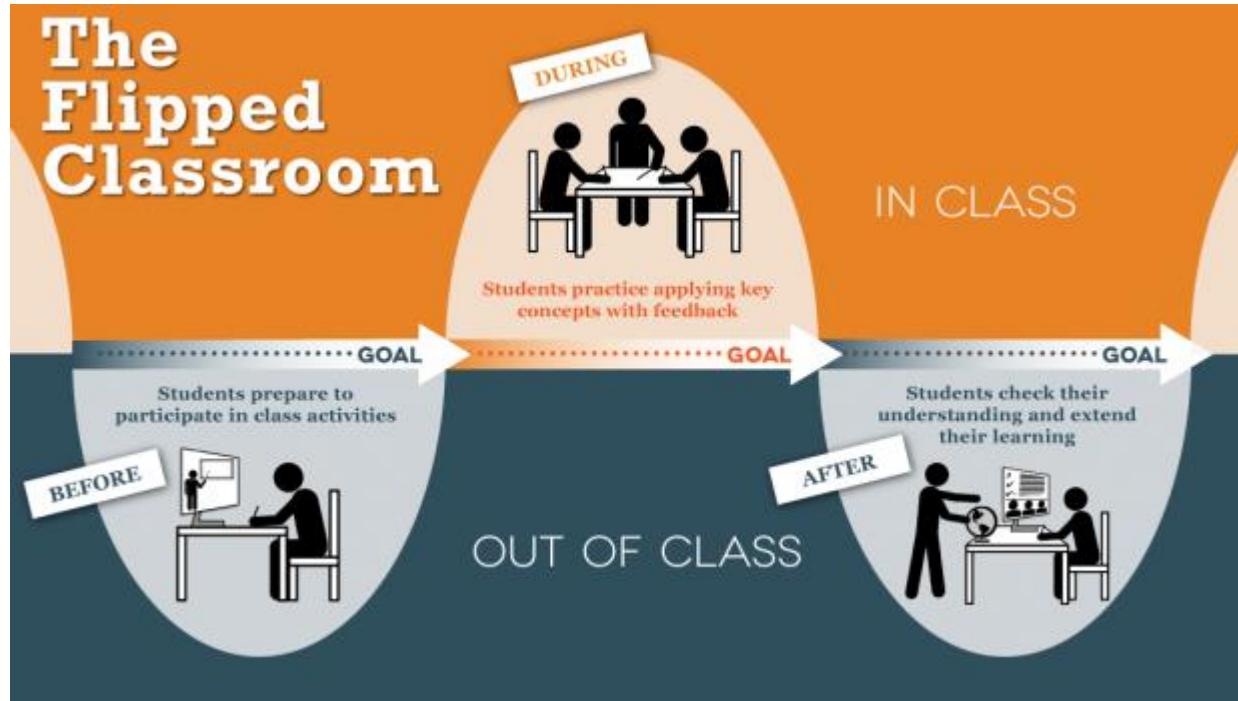
# Busy noisy labs with lots of discussion!





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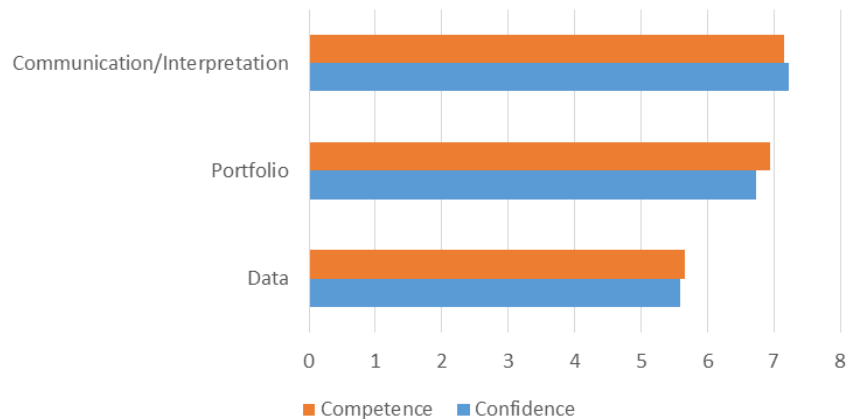
# Flipped classroom



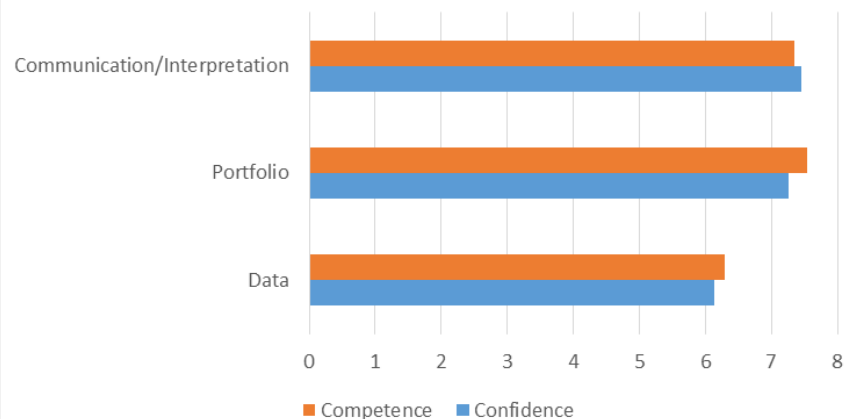


# Student competence and confidence

Student confidence and competence semester 1

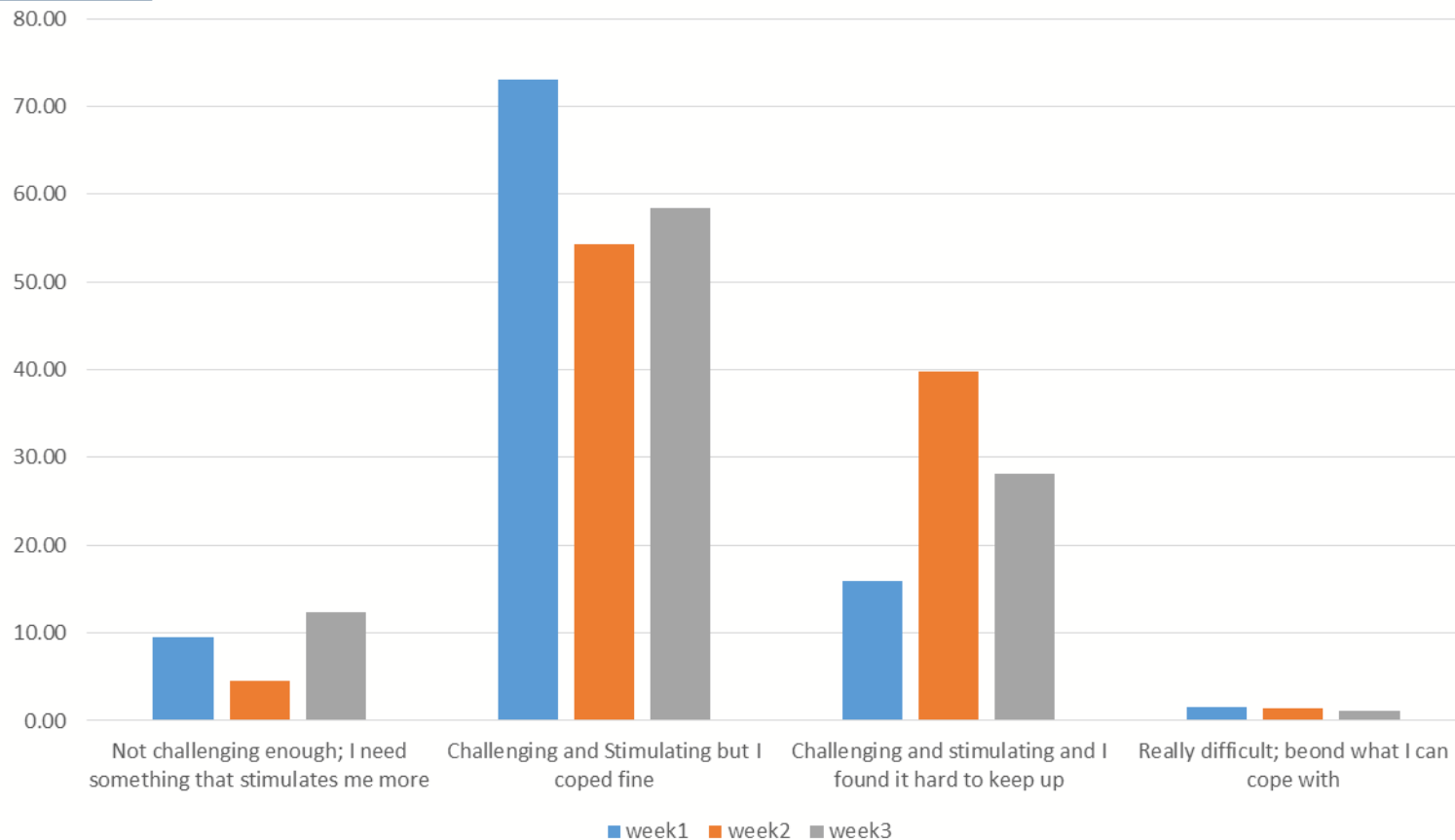


Student competence and confidence semester 2





# Are we challenging our students effectively?





## Communication with our students

### #r\_help

☆ | 725 | 3 | This is for help on R/RStudio. Open to all levels/classes





February 1st, 2017



Student 1

10:46 AM

hi, I really need help with the Lab 1B homework: I've read loads of things online, read all the responses to questions on the forum and watched endless tutorials on YouTube, however I am still no closer to figuring it out 😞 I understand how R needs specific commands to make it complete the functions in the correct way, however I have no idea what these are. I don't know what to input to actually make the code. I have attended the R clinics that I could make within the constraints of my timetable, however the ever looming deadline of 5pm tomorrow is starting to make me panic as I have nothing to hand in. Please can someone offer advice on what to do/where to look/who to ask to try and have something to hand in for tomorrow! Thank you 😊😊



Dale 12:01 PM

added and commented on this R snippet: [Untitled](#) ▼

```
1 library("dplyr")
2 library("readr")
3 library("tidyr") # for going from wide to long
4 ## if you have it installed , you can replace the above three lines with
5 ## one line:
```

Student 1 ; a good place to start for this assignment is: run through the code that you were provided to start with. Go through it line by line. See what it does and make sure you understand it. Look at each table that is created as the result of each function call.



Dale 12:03 PM

uploaded and commented on this image: [ff.png](#) ▼

<code>select()</code>	Include or exclude certain variables (columns)
<code>filter()</code>	Include or exclude certain observations (rows)
<code>mutate()</code>	Create new variables (columns)
<code>arrange()</code>	Change the order of observations (rows)
<code>group_by()</code>	Organize the observations into groups
<code>summarise()</code>	Derive aggregate variables for groups of observations

“ For the first problem, you are asked to use two of the Wickham Six verbs. These are the six verbs.



Dale 12:04 PM

Ask yourself: "how do I calculate an AQ score for each participant? I need to use two of those verbs. I need to treat each participant as a group and then compute a summary variable." What verbs do this? Look back at the previous lab materials [http://talklab.psy.gla.ac.uk/L1\\_labs/lab\\_3/prep/index.html#org0c21792](http://talklab.psy.gla.ac.uk/L1_labs/lab_3/prep/index.html#org0c21792) and make sure you understand the commands being used there.

# Communication with our students



**Dale** 12:04 PM

Student 1

Ask yourself: "how ..... an AQ score for each participant? I need to use two of those verbs. I need to treat each participant as a group and then compute a summary variable." What verbs do this? Look back at the previous lab materials [http://talklab.psy.gla.ac.uk/L1\\_labs/lab\\_3/prep/index.html#org0c21792](http://talklab.psy.gla.ac.uk/L1_labs/lab_3/prep/index.html#org0c21792) and make sure you understand the commands being used there.



**clelandwoods** 12:44 PM

Student 2 Excellent advice from @Dale on approaching the homework. You will find the exercise you did in class on the Moodle page here: <http://moodle2.gla.ac.uk/mod/page/view.php?id=606842> and the homework task here: <http://moodle2.gla.ac.uk/mod/page/view.php?id=607497>. Remember we have all the materials from semester 1 to help you with revision still available on the Moodle page too.



Student 2 2:33 PM

joined #r\_help.



Student 2 2:34 PM

Hi again,

I am having some troubles make separate ggplot's for Male and Female. At first I tried to create separate tables for Mle and Female using:

```
aq_pinfoM <- filter(aq_pininfo, Sex == Male)
```

```
aq_pinfoF <- filter(aq_pininfo, Sex == Female)
```

However both lines of code error'ed saying that there wasn't an object 'Male' or 'Female'. I am confused as Sex is a column within my 'aq\_pininfo' table and 'Male' and 'Female' and within that column both spelt fully and with capitalization.

I then tried to filter the data within the ggplot using the code:

```
ggplot(filter(aq_pininfo, Sex == Male)) + geom_histogram
```

But it is still not recognising 'Male'.

Thanks in advance



**Dale** 2:40 PM

Student 2 the correct syntax would be `Sex == "Male"` with quotes around Male because it is a value rather than the name of a variable. Also you don't have to split the dataset if you use the `facet_wrap()` function from ggplot2

Student 1

2:48 PM

Thank you for the help, it turns out my Rmd file hadn't been downloaded proper and I was missing the chunk of code at the top, which was why I was finding it quite so difficult!

Thanks for getting back to me promptly 😊

# Communication with our students



**roz.coutts** 2:48 PM

Thank you for the help, it turns out my Rmd file hadn't been downloaded proper and I was missing the chunk of code at the top, which was why I was finding it quite so difficult!  
Thanks for getting back to me promptly 😊



1

## Similar conversation started by another student.....



**jenmurch** 5:27 PM

Hi, I'm currently struggling with question 1 of the lab hw 1. I don't understand how to calculate the AQ scores for each individual participant. Any help would be appreciated as I really don't understand. Thanks!



**Dale** 5:52 PM

@jenmurch please see my reply to @roz.coutts above



- Students are asking for help but staff refer back to resources on VLE and previous conversations online
- Possible for team to provide support in one forum

# Not just about



Other assessments in line with new approach

Moved away from choice of topic specific essay questions to one question open to interpretation

*Semester 1: How can psychological research help you be a better student?*

*Semester 2: Reproducible and open science is a hot topic within the scientific community.  
What does it mean and why is it important in Psychology?*

@jude glad you have felt the benefit of one question from your end. What do you think about the student skill development with the new approach?



jude 10:36 AM

@heather well we are training them to think as Psychologists more widely and not just to filter to a specific area. They are already applying their knowledge more widely to concepts. Thanks again for keeping this running during the circumstances.



heather 10:55 AM

Good to know @jude thanks for your thoughts





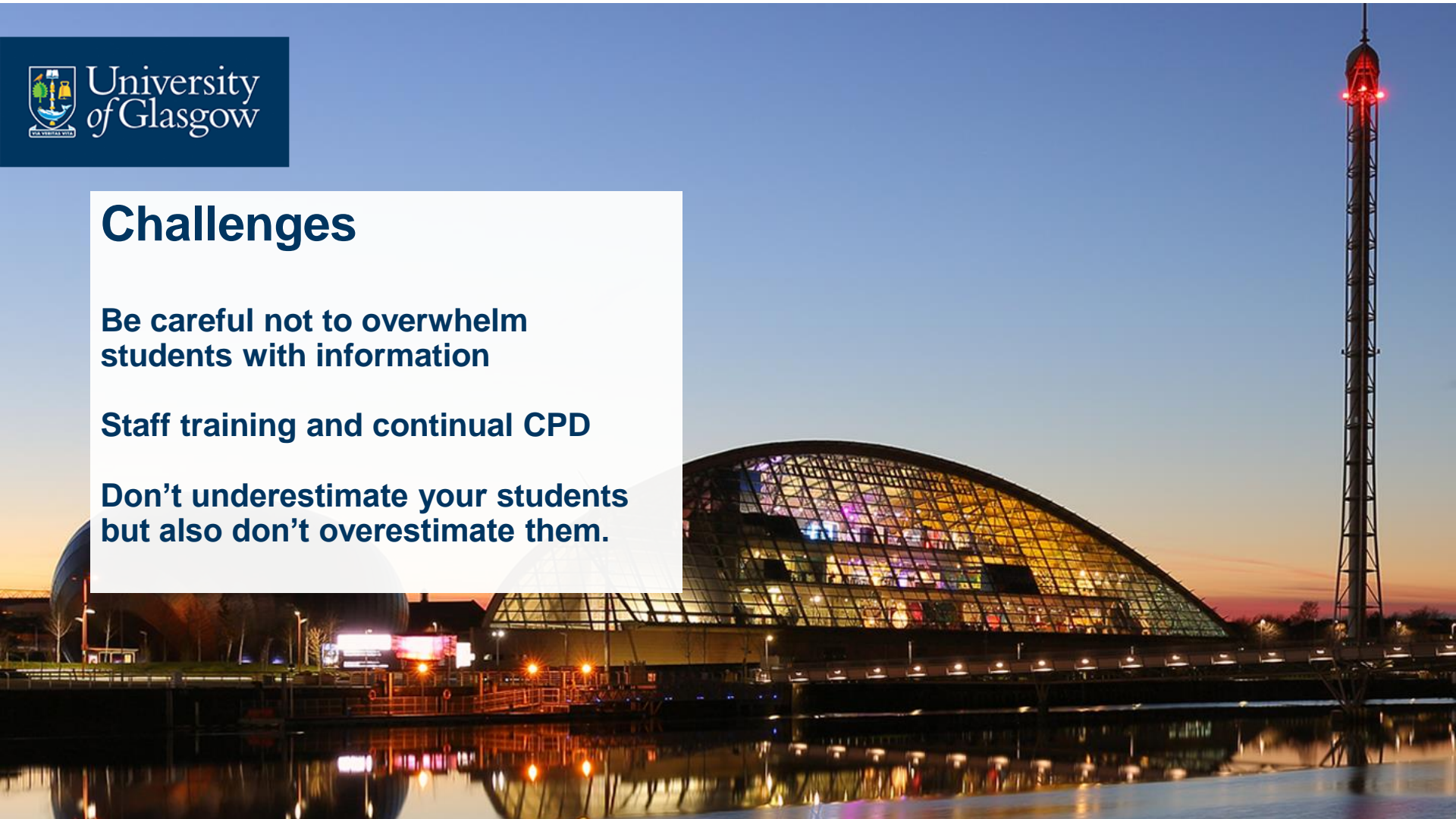
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# Challenges

**Be careful not to overwhelm students with information**

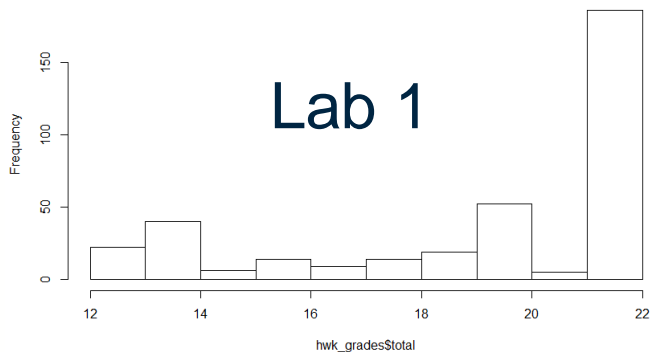
**Staff training and continual CPD**

**Don't underestimate your students but also don't overestimate them.**

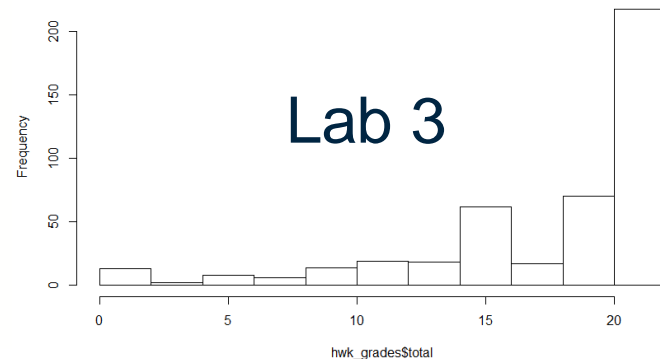


# Student grade profile maintained

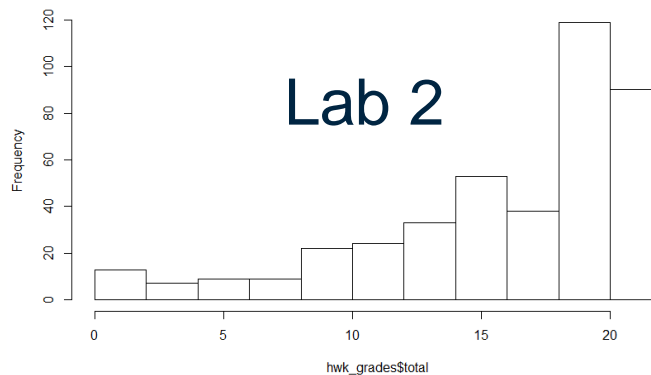
Histogram of hwk\_grades\$total



Histogram of hwk\_grades\$total



Histogram of hwk\_grades\$total



100 students from  
class of 529 make  
merit list!



## Student feedback

- Students felt supported through staff in-class and online interaction as well as office hours
- Link between lectures and practical classes wasn't clear – keep cohesive
- Peer support important
- Research led teaching valued



## Level 1 student comments

*“I was happy that the R homework was marked this semester because that gave me the opportunity to show how much work I put into studying it”*

*“.. establishing my knowledge base of statistics which through the assessed homework I was able to progress my skills and level of competency”*

*“I cannot believe how quickly it has gone and how much I have learned and most of all that I now feel much more confident with R (never thought I would say that).”*

# Level 1 student comments

R isn't a general fix

2015/16

*"If the labs weren't so fast paced and we had time to play with SPSS and really try and understand it."*

2016/17

*"I thought it would be helpful if labs perhaps could have included more instruction how to work in R-studio"*

Still need to develop curriculum explicitly on skill development such as communication and critical thinking

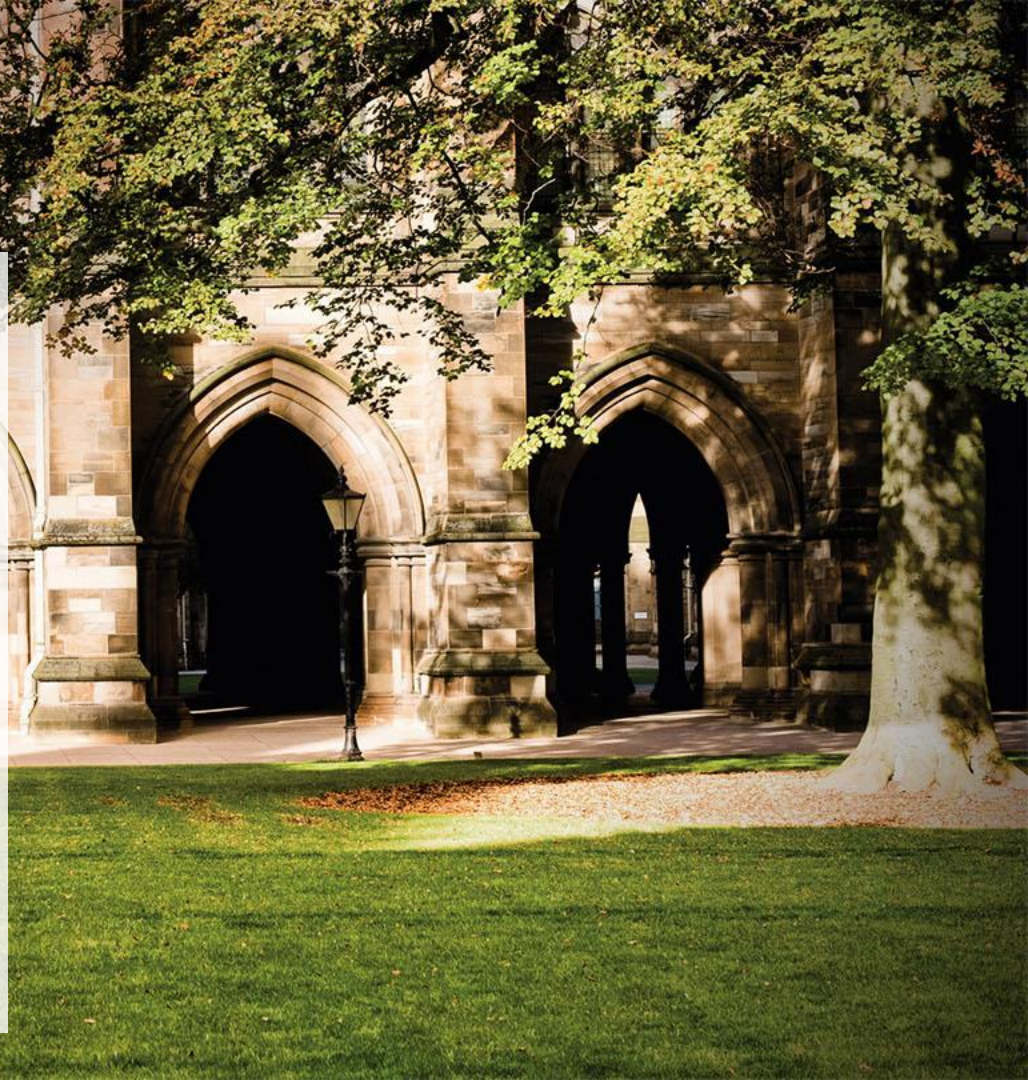




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## External examiner feedback

- Commended on innovative approach
- Other institutions recognize call for development and have acknowledged our innovation
- Resources comprehensive and student oriented response







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## My top tips

- Flexible
- Clear on rationale
- Overview of curriculum
  - holistic approach







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PEOPLE

#UofGWorldChangers



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