

u!magine

Distance Education Innovation
Grant Scheme 2015 - 2016



Levelling the playing field: student and staff experiences of a curated, self-assessed, self-paced multimedia resource

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The issue

Gaps in knowledge and skills

- Subjects assume level of knowledge or skills
- Not prerequisite or core subject content
- May have been learned previously
- Time may have elapsed since learning
- Individuals have different backgrounds and competencies

⇒ Need to level the playing field

Solution

- Need a solution that is:
 - Equitable
 - Flexible
 - Minimal ongoing effort for staff and students

Potential approaches

- Digital curation
- Adaptive scaffolding design
- Multimedia elements
- Self-assessment
- Formative quizzes
- Learning object approach

Antonio and Tuffley 2015; Chen 2014; Faridhan *et al.* 2013; Nagel and van Eck 2012; Bradley and Boyle 2004

Potential benefits

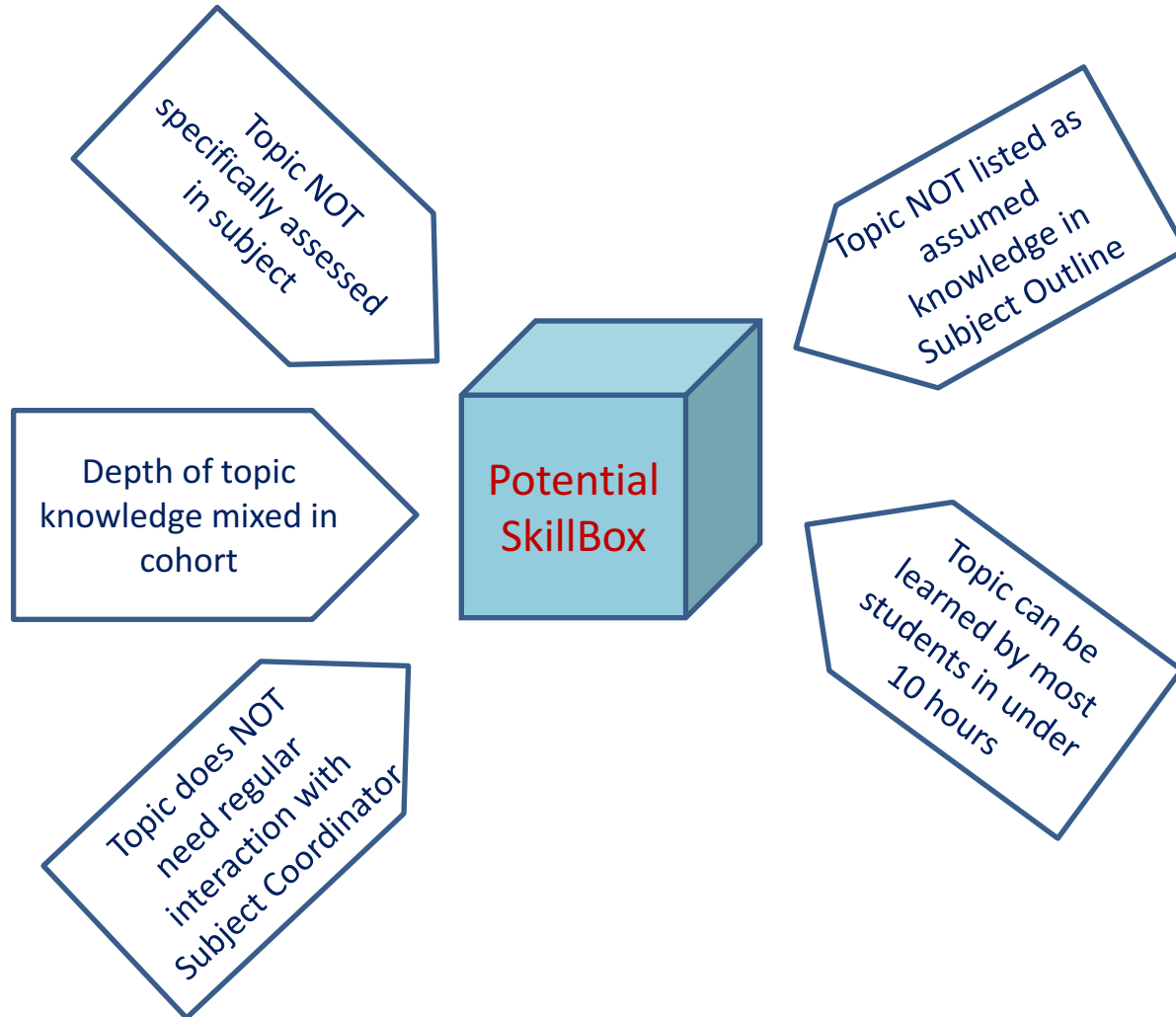
- Improved engagement
- Improved academic performance
- Increased motivation
- Improved learning outcomes
- Allow students to develop alternative perspectives
- Find new ways to solve problems

Anderson and Jacoby 2013; Nagel and van Eck 2012, Antonio *et al.* 2012; MacGregor and Lou 2004; Chen 2014

Requirements identified

- Integrate with CSU's LMS (Blackboard)
- Reusable by academic staff
- Require little to no interaction by staff once added to subject site
- Not form part of subject assessment
- Not add significant workload for students
- Self-paced and self-scaffolded resources

SkillBox - parameters



SkillBox

- Curated online resources
 - Quality videos
 - Online tutorials
 - Additional resources
 - Small repeatable self-assessment quizzes
- Scaffolded
- Student's own pace and own time
- < 10 hours

SkillBoxes so far

- Referencing
- Basic descriptive statistics
- Matrix calculations
- Software package R

SkillBox example

- Statistical package R and R Commander
 - What is R? Installing R, RStudio and R Commander
 - Getting started with RStudio and R Commander
 - Creating summary statistics and charts
 - Working with data and packages
- Used in 8 subject across 2 Faculties
 - BIO263 Methods in Environmental Data Analysis, SPA503 GIS Algorithms, SPA407 Applied Geostatistics, STA201/401 Scientific Statistics, STA308/508 Experimental Design and Analysis, STA404 Statistical Reasoning

Text and worked examples

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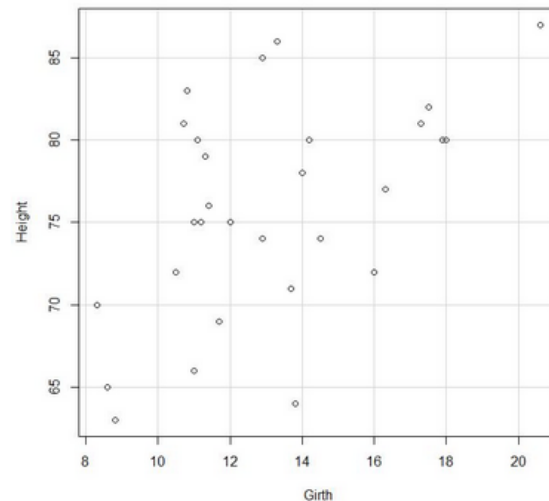
Basic charts

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In R Commander

Make sure the dataset is "trees", as in the section on Basic Statistics. First we will create a scatter plot of girth vs height.

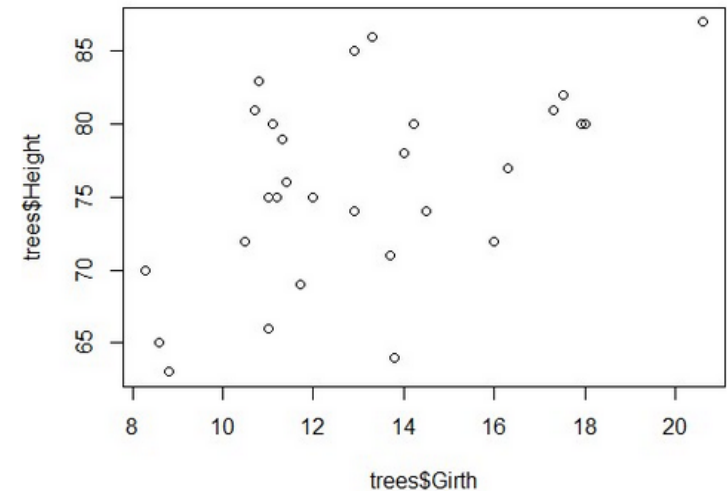
Click on [Graphs > Scatterplot](#). Under x-variable select [Girth](#) and under y-variable select [Height](#). Click [OK](#). A scatterplot of Girth by Height is displayed.



In RStudio

First we will create a scatter plot of girth vs height. Enter

```
>plot(trees$Girth, trees$Height)
```



We can add a title, axis labels and a least squares line with the following command:

Video tutorial

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R SkillBox part 1: What is R?

- Introduction
- Installing R
- Installing RStudio
- Installing R Commander

R SkillBox part 2: Getting started

- Command line arithmetic
- Video tutorial: Getting started
- Further resources
- Self assessment: R SkillBox

R SkillBox part 3: Summarising data

- Basic statistics
- Basic charts
- Video tutorial: basic statistics**
- Further resources
- Self assessment: R SkillBox

R SkillBox part 4: Working with data

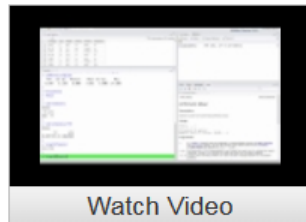
- Working with your own data
- Working with packages
- Miscellaneous commands
- Video tutorial: Working with data
- Further resources
- Self assessment: R SkillBox

Video tutorial: basic stats and basic charts

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Watch



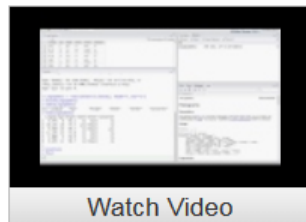
Summary Statistics in R: Mean, Standard Deviation, Frequencies, etc (R Tutorial 2.7)

User: MarinStatsLectures - Added: 10/08/13

YouTube URL: <http://www.youtube.com/watch?v=ACWuV16tdhY>

Watch Video

Learn how to produce numeric summaries for both categorical and numerical variables in R. You will learn to produce frequency and contingency tables and to calculate mean, median, variance, standard deviation and many more operations using commands such as "table", "mean", "median", "var", "sd", "summary", etc.



Histograms in R (R Tutorial 2.3)

User: MarinStatsLectures - Added: 09/08/13

YouTube URL: <http://www.youtube.com/watch?v=Hj1pgap4UOY>

Watch Video

Further resources

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 - Basic charts
 - Video tutorial: basic statistics
 - Further resources**
 - Self assessment: R SkillBox part 3
- R SkillBox part 4: Working with data
 - Working with your own data

Further resources

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Continue on with [Code School - Try R](#). Work through to Chapter 4 Summary Statistics.

Also refer to the Further Resources in the previous section.



Got it! Go to the [self assessment quiz](#)

Self assessment

QUESTION 1

1 points

Save Answer

In the trees dataset, what is the maximum height?

QUESTION 2

1 points

Save Answer

What is the range of volume in the trees dataset?

From to

QUESTION 3

1 points

Save Answer

Consider the following sample of 10 data points: 3.6, 4.1, 4.6, 4.4, 4.0, 3.7, 4.0, 4.3, 3.3, 4.2

If using R Commander:

Choose Data -> New Data Set -> OK and enter the data into the first column. Then choose File -> Close -> Graphs -> Boxplot, then select the name of the variable containing the data -> Click OK.

If using RStudio:

In the Console enter

```
>boxplot(c(x, y, ..., z))
```

where x, y,...,z are the numbers given above.

Other features

- Links between sections – basic scaffolding

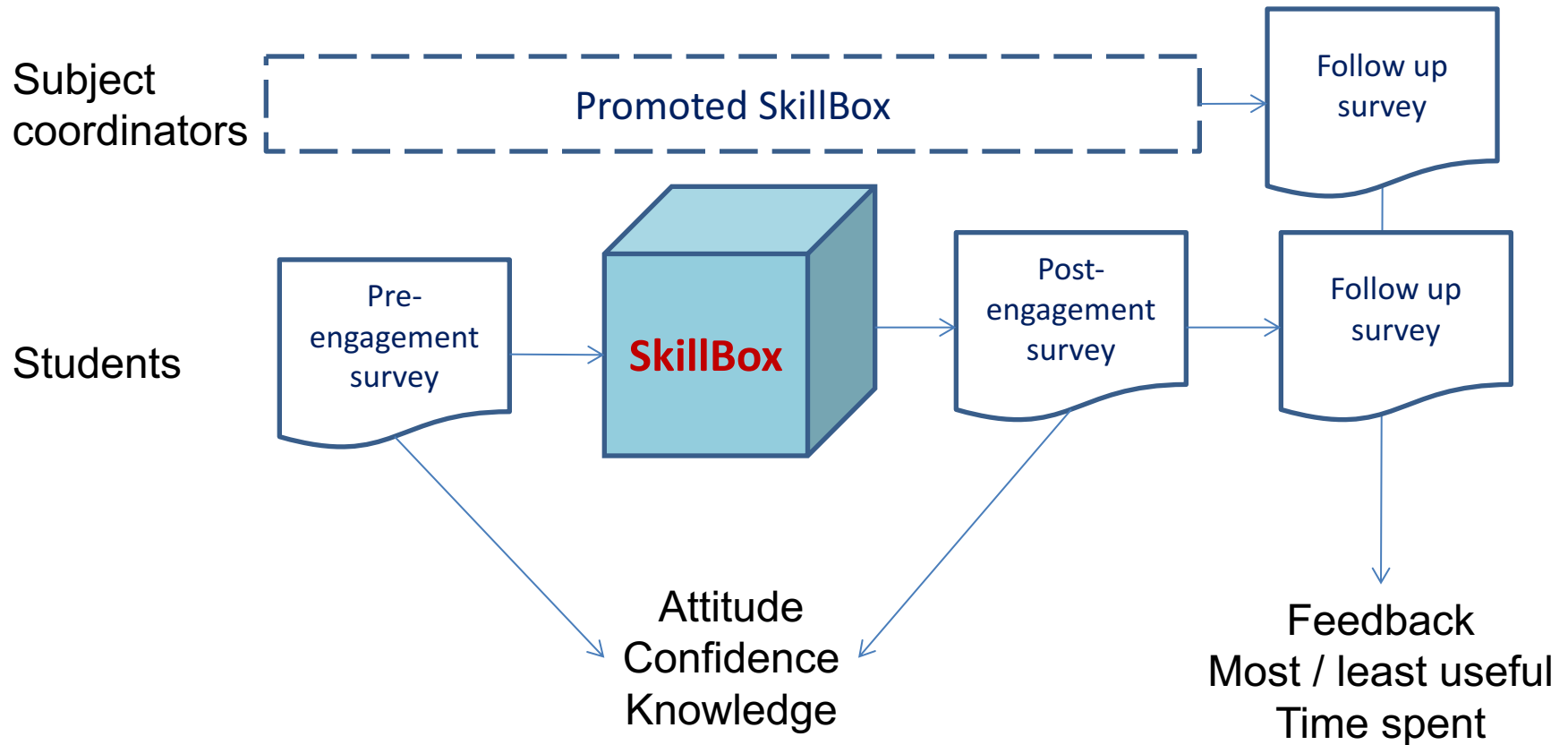


Got it! Go to the [self assessment quiz](#)



More explanation please! Go to the [video tutorial](#).

Research Methodology



Survey

QUESTION 1

0 points

Save Answer

I am confident in the topic of R

- ☐ 1. Strongly Agree ☐ 2. Agree ☐ 3. Neither Agree nor Disagree ☐ 4. Disagree ☐ 5. Strongly Disagree ☐ 6. Not Applicable

QUESTION 2

0 points

Save Answer

I am not interested in R

- ☐ 1. Strongly Agree ☐ 2. Agree ☐ 3. Neither Agree nor Disagree ☐ 4. Disagree ☐ 5. Strongly Disagree ☐ 6. Not Applicable

QUESTION 3

0 points

Save Answer

I can see the relevance of R to my degree

- ☐ 1. Strongly Agree ☐ 2. Agree ☐ 3. Neither Agree nor Disagree ☐ 4. Disagree ☐ 5. Strongly Disagree ☐ 6. Not Applicable

QUESTION 4

0 points

Save Answer

I think it will take me longer to understand R than the average person

- ☐ 1. Strongly Agree ☐ 2. Agree ☐ 3. Neither Agree nor Disagree ☐ 4. Disagree ☐ 5. Strongly Disagree ☐ 6. Not Applicable

Research Participation

Overall student access (March 2015 – July 2016)

Enrolled in SkillBox subject	Accessed SkillBox	Completed at least 1 quiz
281	125 (44.5%)	82 (29.2%)

Student research participation (March 2015 – July 2016)

Invited to participate in research	Completed pre-survey	Completed post-survey	Completed follow-up survey
234	26 (11.1%)	13 (5.5%)	4 (1.7%)

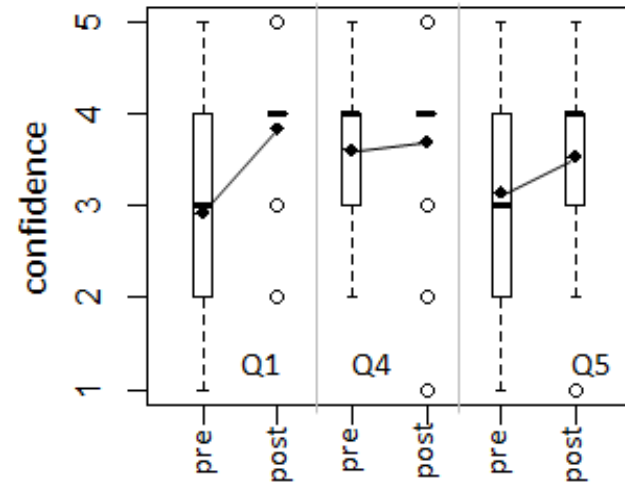
Staff research participation

Invited to participate in research	Completed follow-up survey
6	3 (50%)

Accessed over 400 times (unique hits, duplicate students possible) since July 2016

Quantitative Results

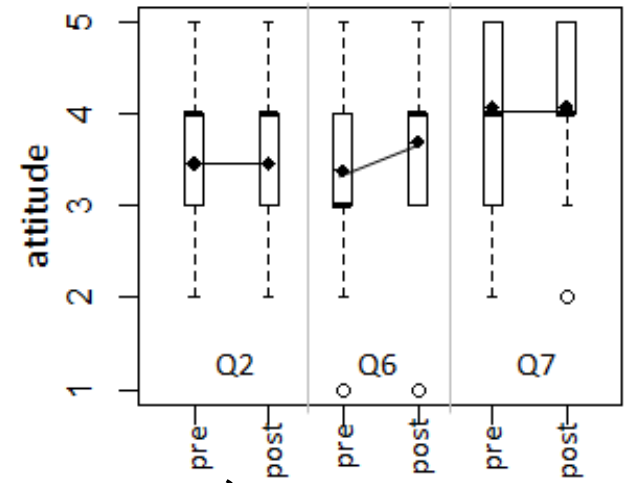
Changes in
confidence and
attitude pre- and
post-engagement



"I am confident in the topic"

"I think if will take me longer to understand the topic than the average person"

"I know I can handle difficulties in the topic"



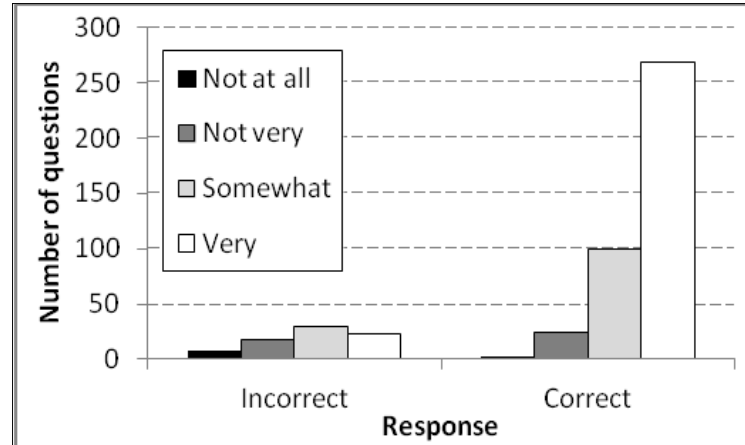
"I am not interested in the topic"

"I find the topic frightening"

"I think understanding the topic will be important in this subject"

Quantitative Results

Self-reported
confidence and
accuracy



Average time spent using SkillBox:
3 hours 28 minutes
(40 minutes – 20 hours)

Qualitative Results

“A number of elements were useful: use of simple examples to highlight core principles, easy to access format and repeated access” (Student – Matrix SkillBox)

“I really relied on SkillBox... SkillBox provided me with all the relevant information I needed to get started with the subject and as a reference tool to return to later... It was for me at least a very valuable tool” (Student – Matrix SkillBox)

“I was very satisfied with the SkillBox experience” (Student – Matrix SkillBox)

“I liked that it was quite basic instruction” (Student – Matrix SkillBox)

“(Most useful were) the video tutorials and the quizzes offered” (Student – Descriptive Statistics SkillBox)

“Explain more what can be learned from the examples...What it teaches us” (Student – Descriptive Statistics SkillBox)

“(Need) more examples of the application / relevance ... early on” (Student – Matrix SkillBox)

“I would recommend incorporating SkillBox in as many other subjects as possible” (Student – Matrix SkillBox)

“(I would promote the use of SkillBox as) it provides engaging meaningful content which helps students get prepared for the subject” (Subject coordinator – Matrix and R SkillBoxes)

Discussion

- Lots of students used one or more SkillBoxes
- Not many participated in the research
 - Research design?
 - Students oversurveyed?
- Some started using a SkillBox then stopped
 - SkillBox unnecessary because they already possessed the skills and knowledge?
 - Or confusing or not useful?

Findings

- Increase in confidence pre- and post-engagement with SkillBox
- Correlation between confidence and accuracy of answers
 - Was confidence gained because of SkillBox content?
 - Or did students already possess confidence in and knowledge of the topic?

Findings

- Students and staff found SkillBox useful and liked the way it was structured
- No extra workload for subject coordinators
 - One way to provide rich multimedia resources with minimal time and effort
- SkillBox promotes equity for students
 - Could improve student satisfaction, retention, academic performance

Lessons learned

- Need the right support and resources to carry out SoTL research
 - Research design, survey design, improving response rates, qualitative analysis
- SoTL research should be given the same status as discipline-based research
 - In many academic circles it is not
- How to increase academic engagement in SoTL research?

Conclusion

- SkillBox can contribute to:
 - Increasing confidence in a topic
 - Improving content knowledge
 - Improving attitudes towards the topic
 - Increasing student satisfaction, engagement, motivation, retention and academic performance
- Resources like SkillBox are needed

Where to from here?

