Flexible and Effective Learning Environment Creation Strategies in a Concurrent Hybrid Modality

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Course Background

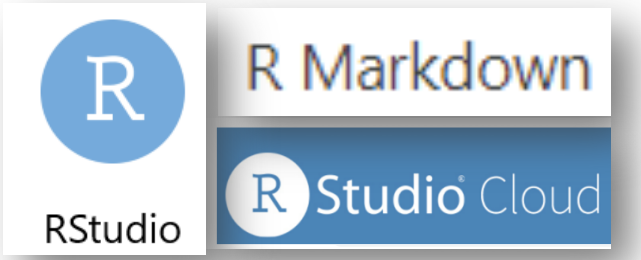
Computer Applications in Forestry

Preparing students to be proficient in high-level computing and analyze a wide variety of forestry-related data.

Course Background

Major Learning Component

- Document processing
- Data handling and analyzing
- Data visualizing and summarizing
- Managing and Analyzing geodata



Hybrid Instructional Models

Have you tried any type of Hybrid modality in your class?

Hybrid Instructional Models

1. Concurrent Hybrid
2. Asynchronous Hybrid
3. Sequential Hybrid
4. Multi-Section Hybrid
5. Alternating Hybrid

Discussion Paper on Hybrid Teaching and Learning:

Hybrid Instructional Models

1. Concurrent Hybrid
2. Asynchronous Hybrid
3. Sequential Hybrid
4. Multi-Section Hybrid
5. Alternating Hybrid

Which hybrid modality might be the best for your course?

Hybrid Instructional Models

1. Concurrent Hybrid
2. Asynchronous Hybrid
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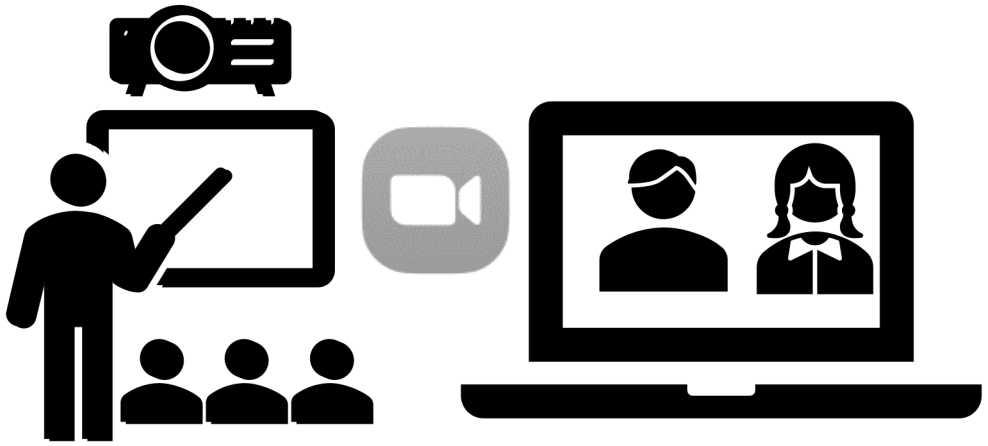
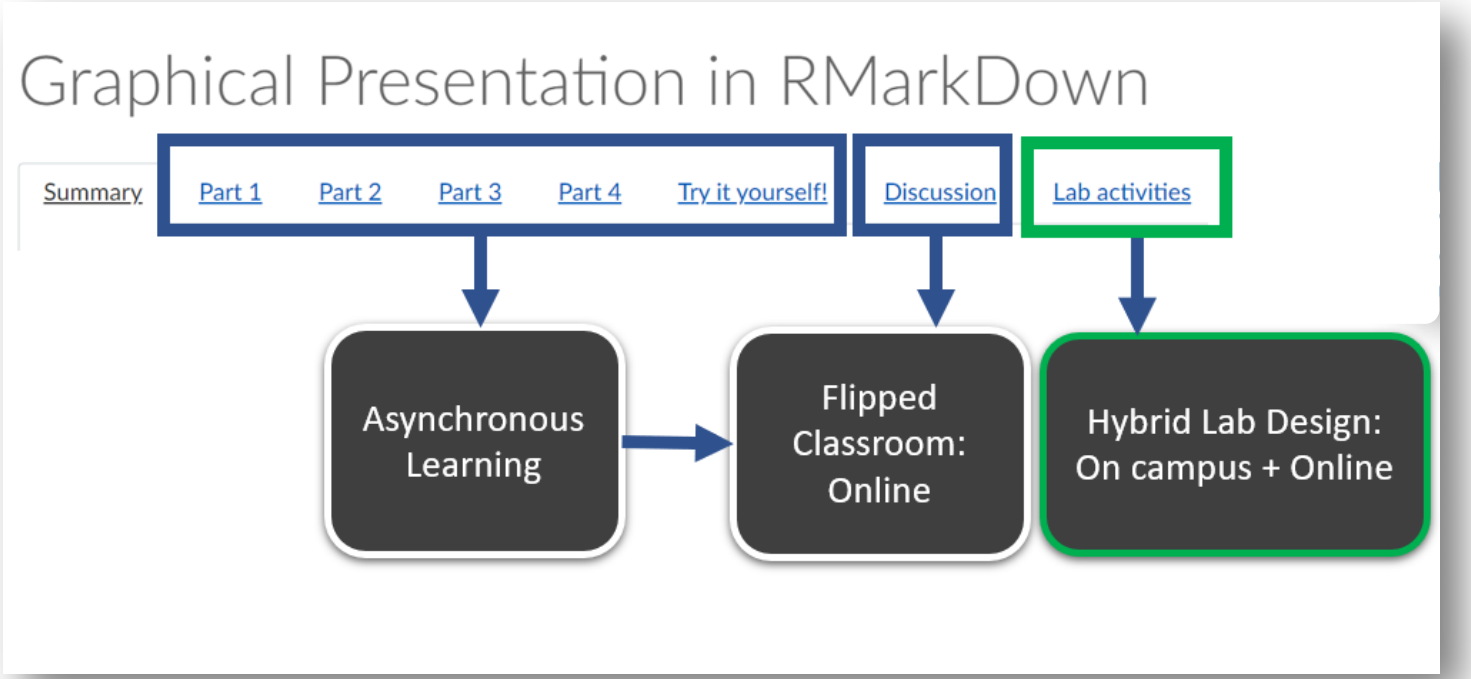


Adaptation Strategies: Learning Module

Assessment of Learning

- Quiz
- Discussion questions
- Assignment
- Presentation and peer-review
- Exams

Instructional Approaches



Suitable location for a hybrid modality

Learning Design

Graphical Presentation in RMarkDown

Summary | Part 1 | Part 2 | Part 3 | Part 4 | Try it yourself! | Discussion | Lab activities

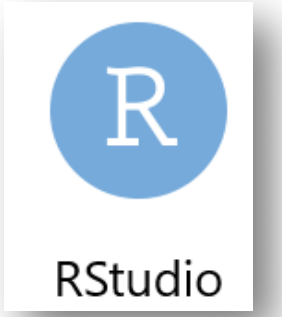
Lesson Objectives

After studying this lesson you should be able to:

- Create scatter plots, line graphs, bar graphs, pie charts, and histograms
- Customize additional items on a graph
- Add legends to graphs
- Save graphs as an image or pdf file

Module checklist:

- Part 1 Quiz
- Part 2 Quiz
- Part 3 Quiz
- Part 4 Quiz
- In-class Discussion
- Lab Assignment



Learning Design

Graphical Presentation in RMarkDown

Summary | Part 1 | Part 2 | Part 3 | Part 4 | Try it yourself! | Discussion | Lab activities

Basic Graphs: RStudio and R Markdown

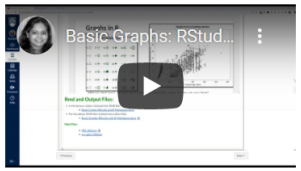
Lesson Objectives

After studying this lesson you should be able to:

- Familiar with creating a scatter plot
- Familiar with handling parameters in plot function and creating publication quality graphs
- Setting margins in a graph

Lecture Videos:

1. Audio Enabled Video



Lecture slides:

1. Basic Graphs in R: Basic Graphs RStudio and R Markdown.pptx

Rmd and Output Files:

- In the lecture video, I showed the .RMD file:
  - Basic Graphs RStudio and R Markdown.Rmd
- For the above .RMD file I knitted into a Word and HTML file:
  - Basic-Graphs-RStudio-and-R-Markdown.docx
  - Basic-Graphs-RStudio-and-R-Markdown.html

Data Files:

- VRI_data.csv
- vri_data-2.RData

Complete Quiz 1

◂ Previous | Next ▸

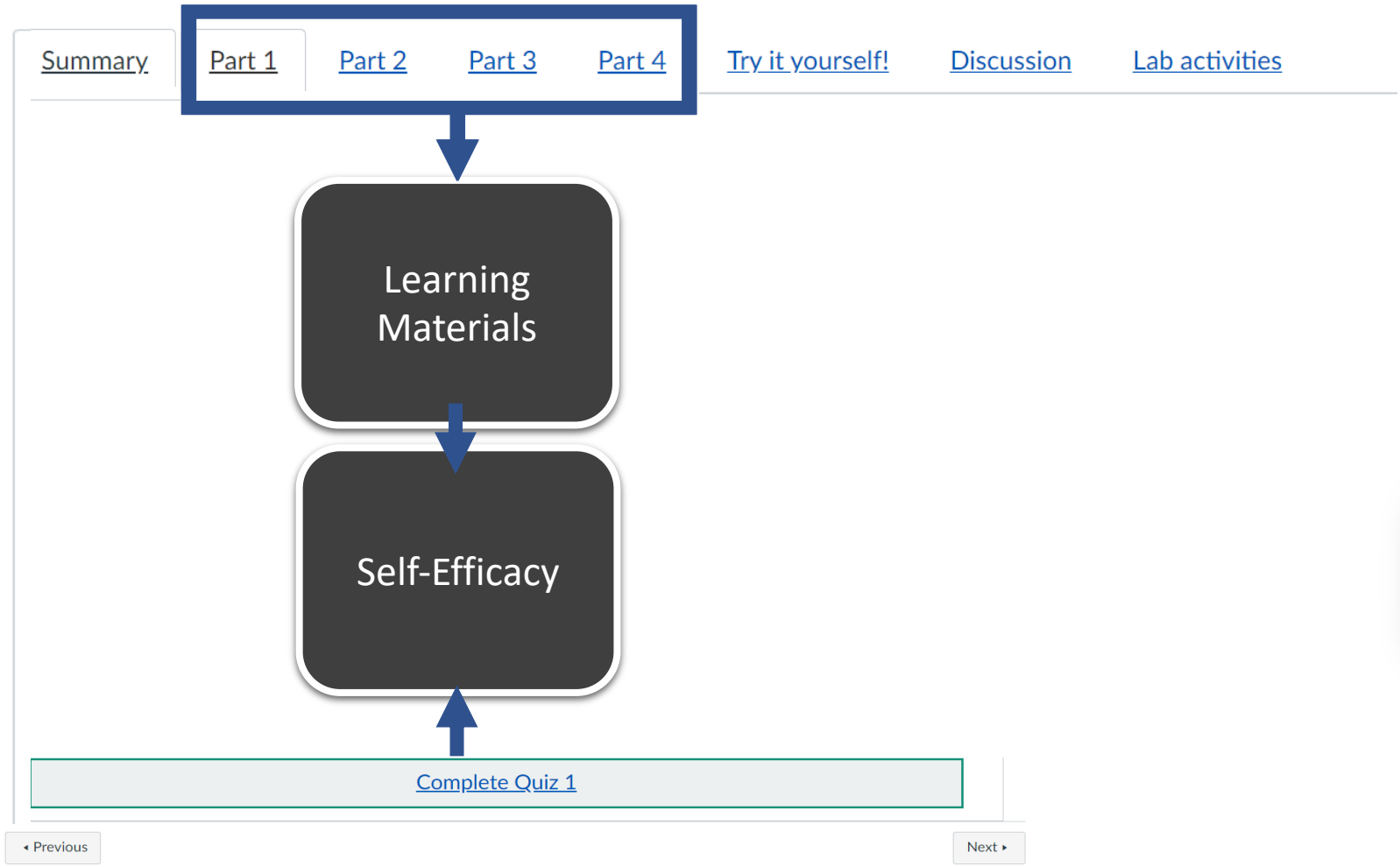
RStudio

R Markdown

RStudio Cloud

Learning Design

Graphical Presentation in RMarkDown



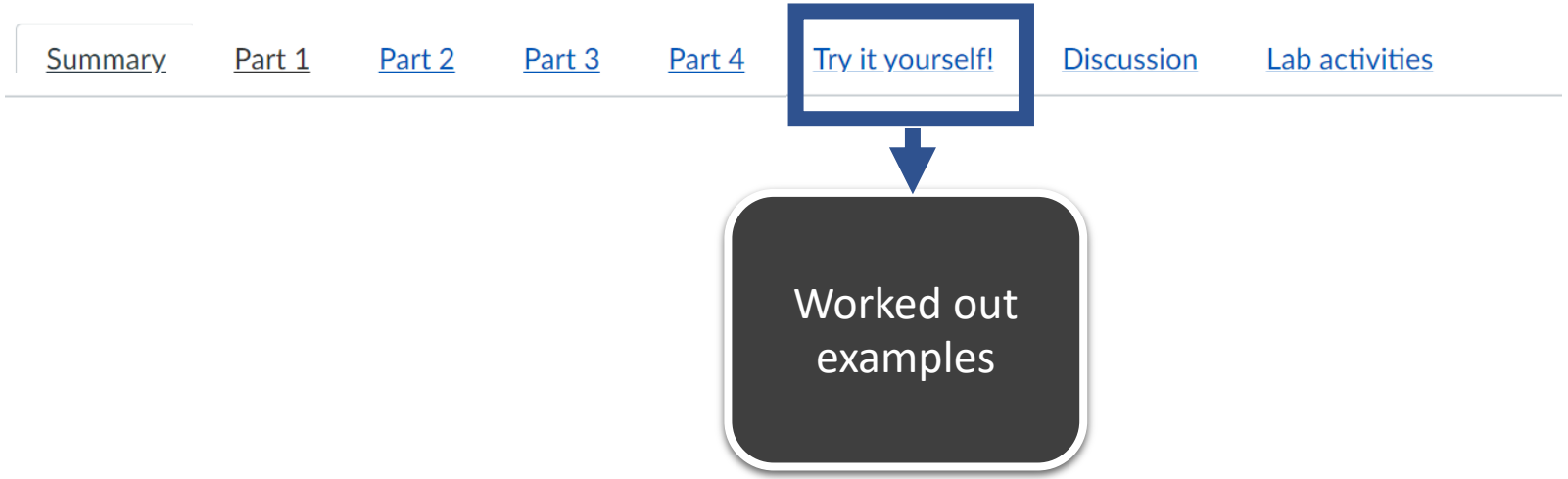
RStudio

R Markdown

RStudio Cloud

Module Structure

Graphical Presentation in RMarkDown



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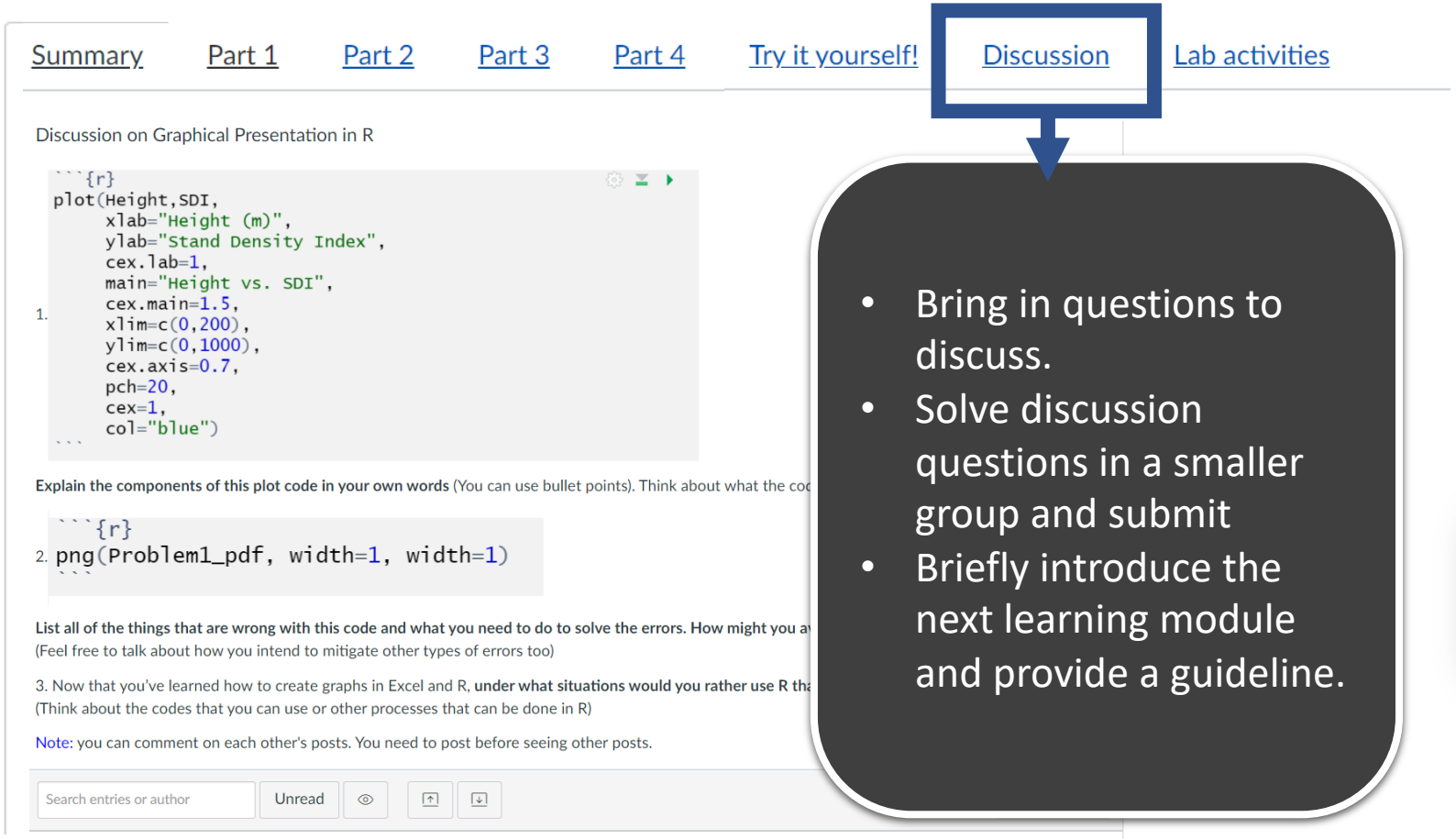
Module Structure

Graphical Presentation in RMarkDown



- Bring in questions to discuss.
- Solve discussion questions in a smaller group and submit
- Briefly introduce the next learning module and provide a guideline.

RStudio

R Markdown

RStudio Cloud

Module Structure

Graphical Presentation in RMarkDown

Summary | Part 1 | Part 2 | Part 3 | Part 4 | Try it yourself! | Discussion | Lab activities

Lab Activities: Graphical Presentation in R Markdown

Graphical Presentation in R Markdown

Learning Objectives:

- Create figures from data in R
- Control parameters, legends, and plotting windows of the figures in R
- Save the figures as an image file

Platform: R/RStudio/R Markdown

Please download the following file before coming to the lab:

CSV file: airquality.csv

RMD file:lab6.Rmd

Word file: lab6_demo.docx

Output files: Problem_1.png , Problem_3.png

Schedule:

Time	Activities
45 minutes	• Demonstration
Break	Break for 15 minutes
60 minutes	• Start working on your assignment with your group members

Materials to be covered:

1. Create point and line graphs using plot() function in R from different subsets of data
2. Adjust parameters in plot() function and add a legend
3. Create a side-by-side plot using par() function
4. Save graph as a .png file using png() function

◂ Previous | Next ▸

- Demonstrate lab activities
- Solve problems in a group on a shared platform

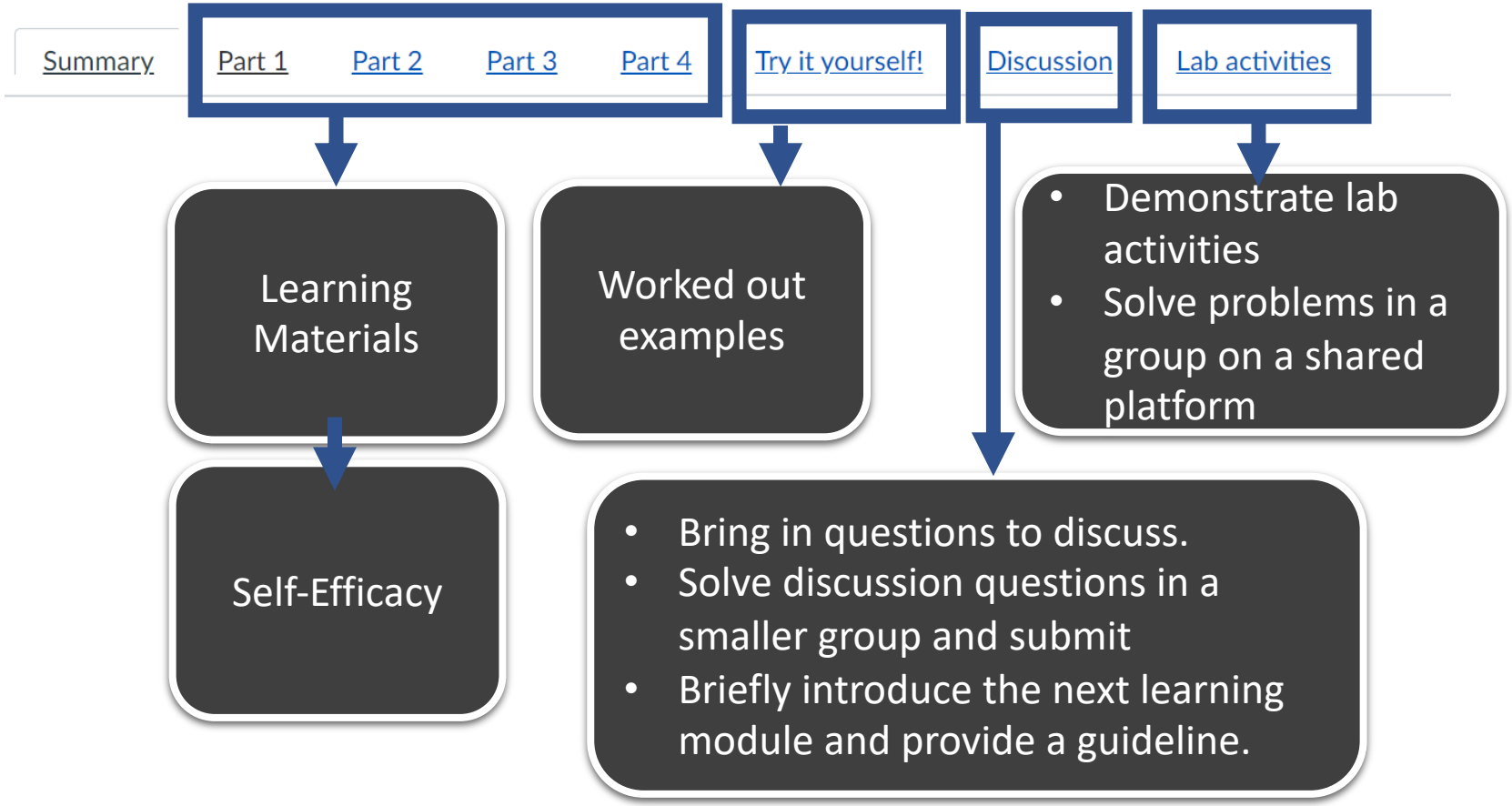
RStudio

R Markdown

RStudio Cloud

Module Structure

Graphical Presentation in RMarkDown



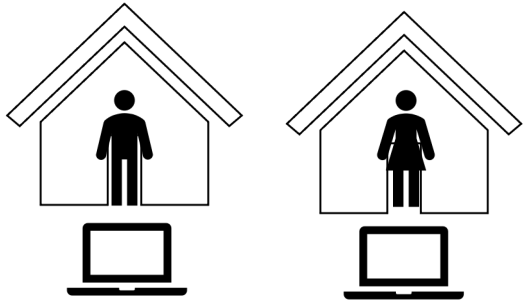
Hybrid Class Design

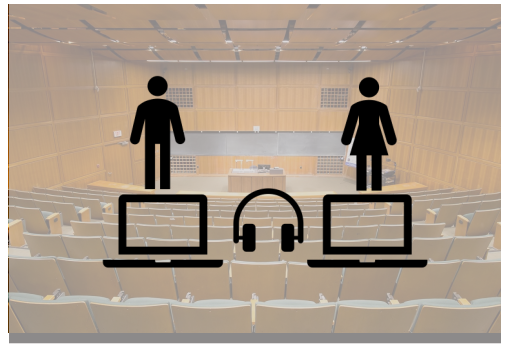
Instructor

Instruments

1. Laptop
2. Microphone that can cancel noise
3. Headphone: blue tooth enabled or
   Mic for the classroom: lapel
1. Camera for live streaming
2. Wired internet

Teaching Assistants





Facilitation

1. Training session: TAs

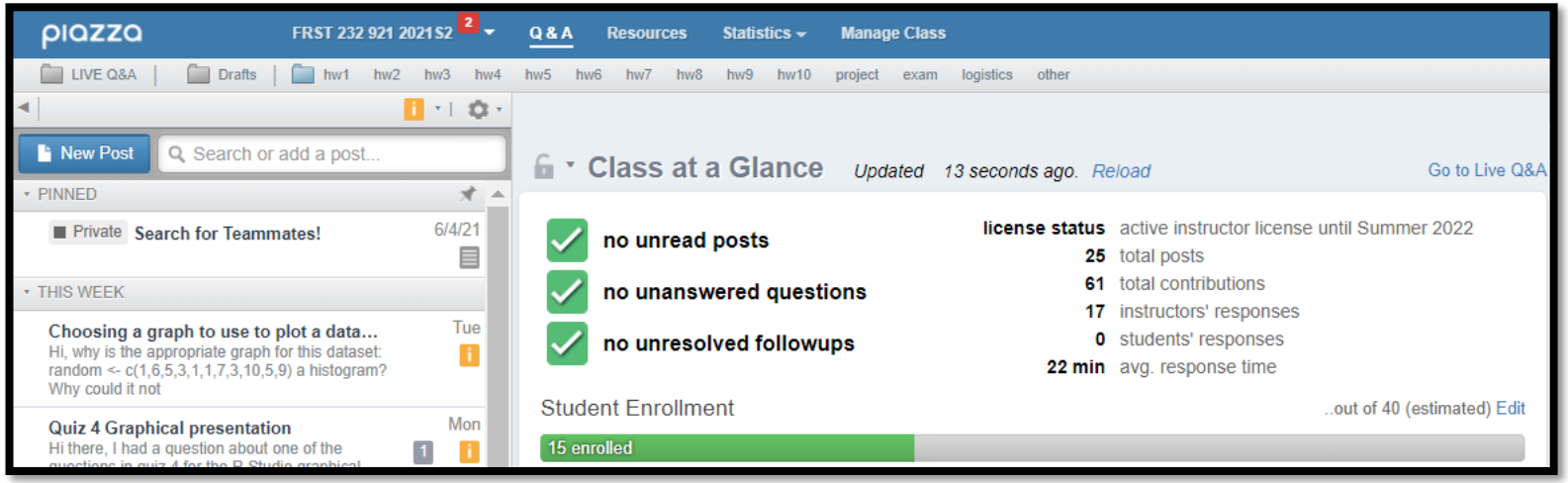
2. Specify hybrid design and expectation

3. Late arrival or quarantine period

4. Flexibly join any platform: in-person or online

Communication Tools

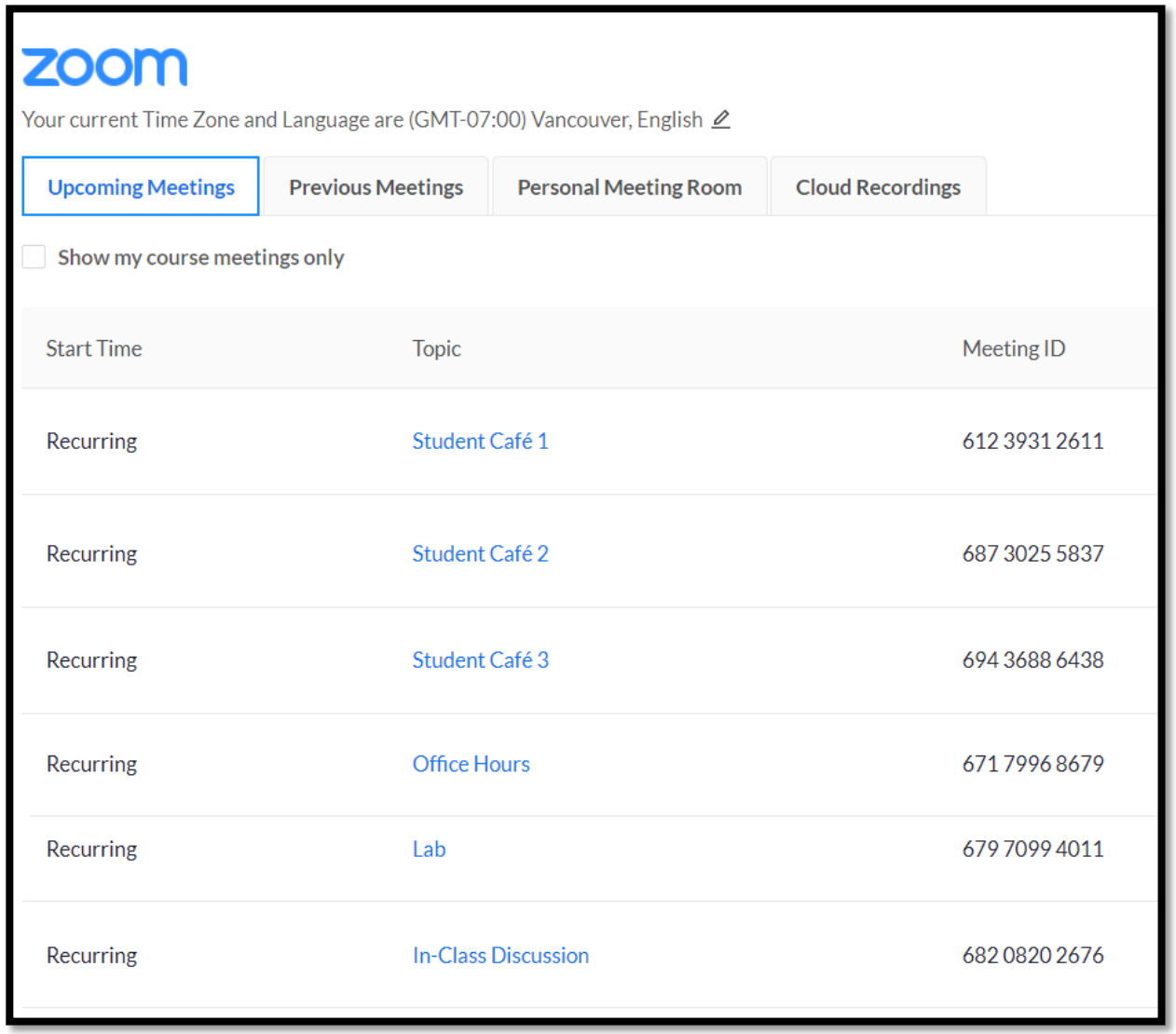
Microsoft Teams



- Group discussion
- Solving Problems in a group
- Communicate with the teaching team and others

- Introduce themselves
- Post questions outside the class time
- Get help from the teaching team and peers

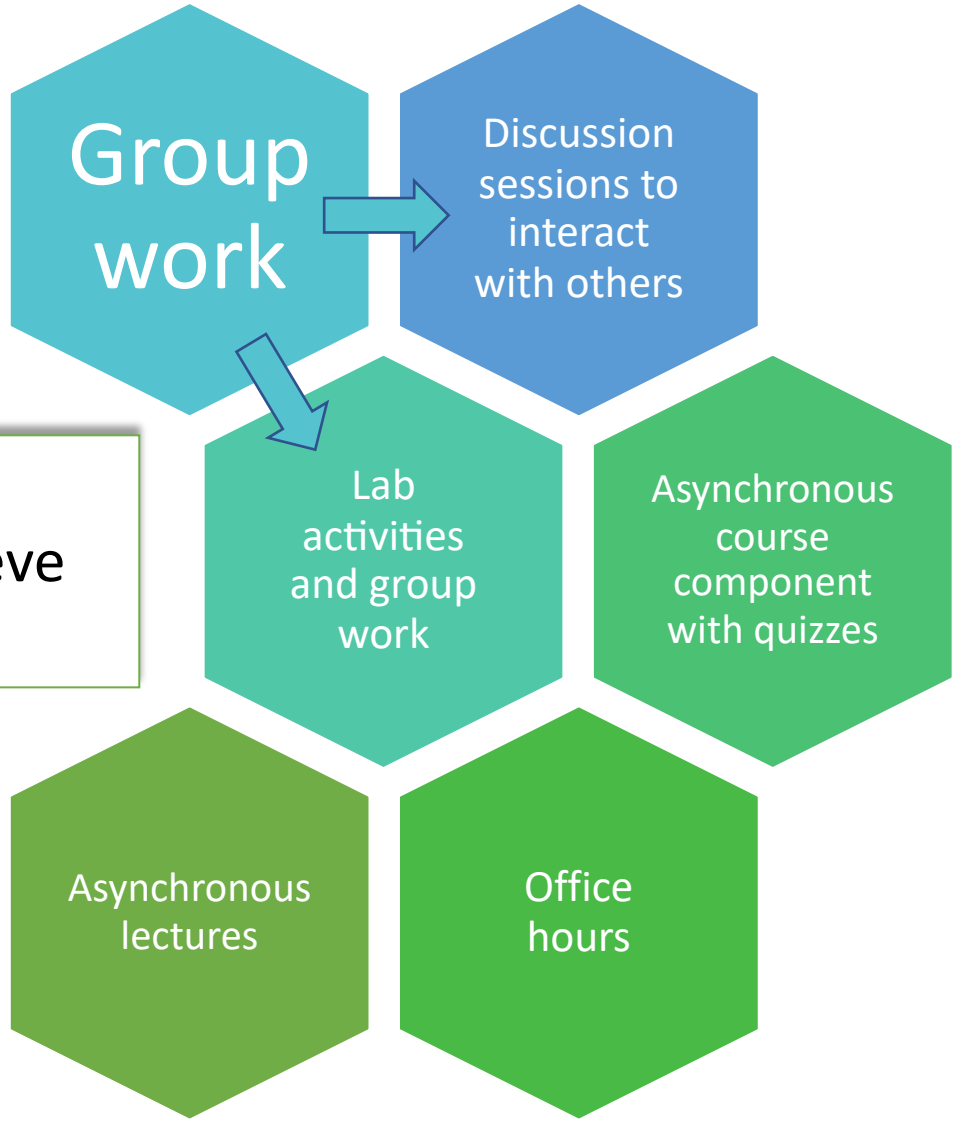
Communication Tools



- Group Discussion outside the class time
- Get help from the teaching team every weekdays

Evaluation: Achieving Learning Goasl

Effective Course Component to Achieve Learning Goals



Advantages

Challenges

1. High level of flexibility
2. Single communicating platform
3. Split TAs
4. Solving problems on a shared page
5. Bluetooth enabled microphone
6. TA training
7. Practice session for students
8. Organize learning modules and activities with a clear guideline
9. Recorder the live-streamed demonstration segment and make it available asap

1. Mix online and in-person students for a group activity.
2. Wifi connection
3. Bluetooth enabled microphone
4. Many students show up in-person than the capacity in the lab

Adjustment and Challenges

- Any adjustments needed to adopt hybrid modality in your course?
- Any challenges that may come up for the teaching team and students?

Research Objectives

1. Measure changes in confidence in learning modules
2. Measure changes in self-efficacy and engagement
3. Trends for the mastery of content knowledge
4. Mastery difference among online and in-person students
5. Making inference for mastery levels based on previous experience, joining platform (online or in person) and demographics

Evaluation Strategies

Three Stages Surveys:

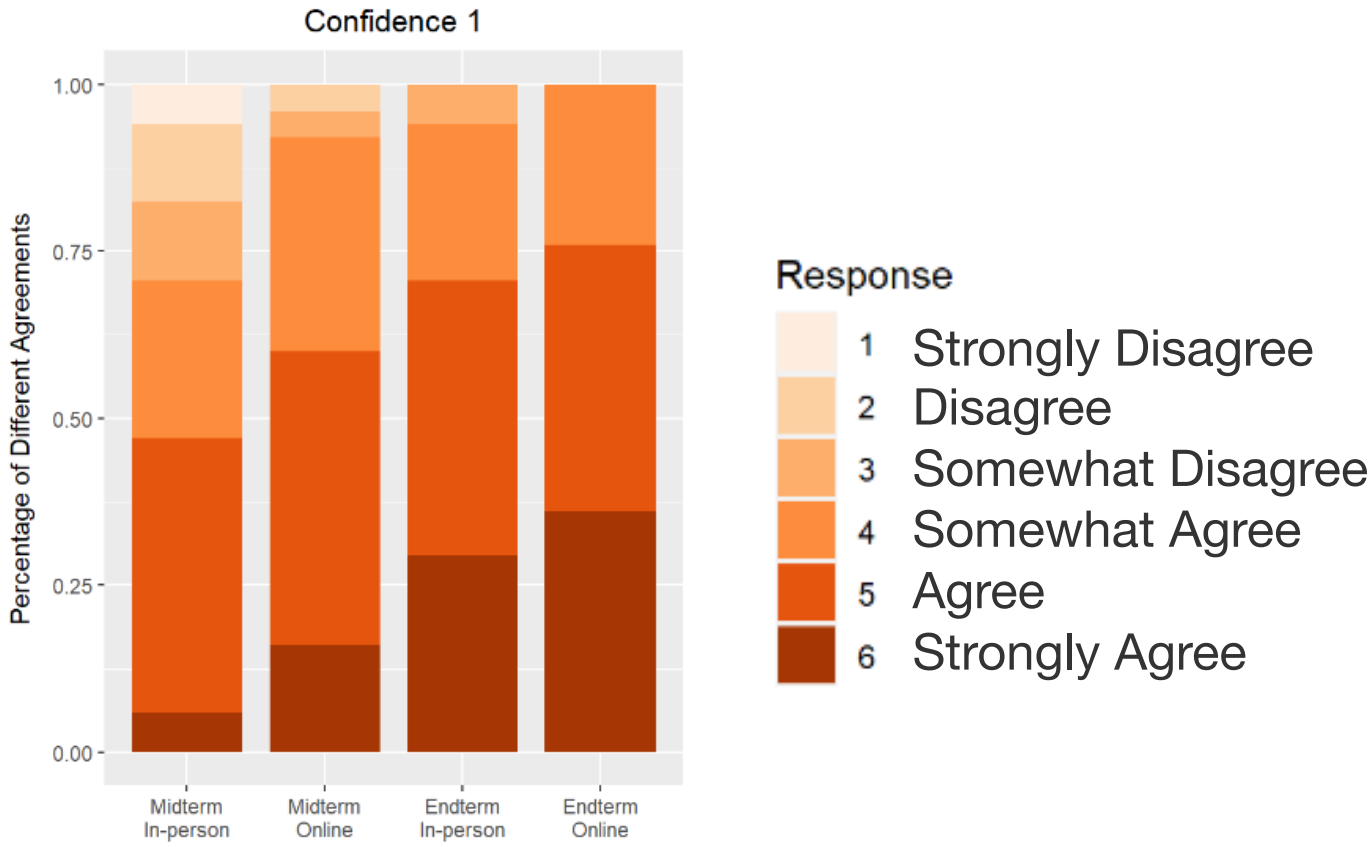
1. Beginning of the term → Learning goals, expectations, prior experience and demographics
2. Midterm → Self-efficacy, confidence in applying independently, mastery gained and engagement
3. End of the term → Meeting the learning Goals and joining platform most of the time

Data Summary

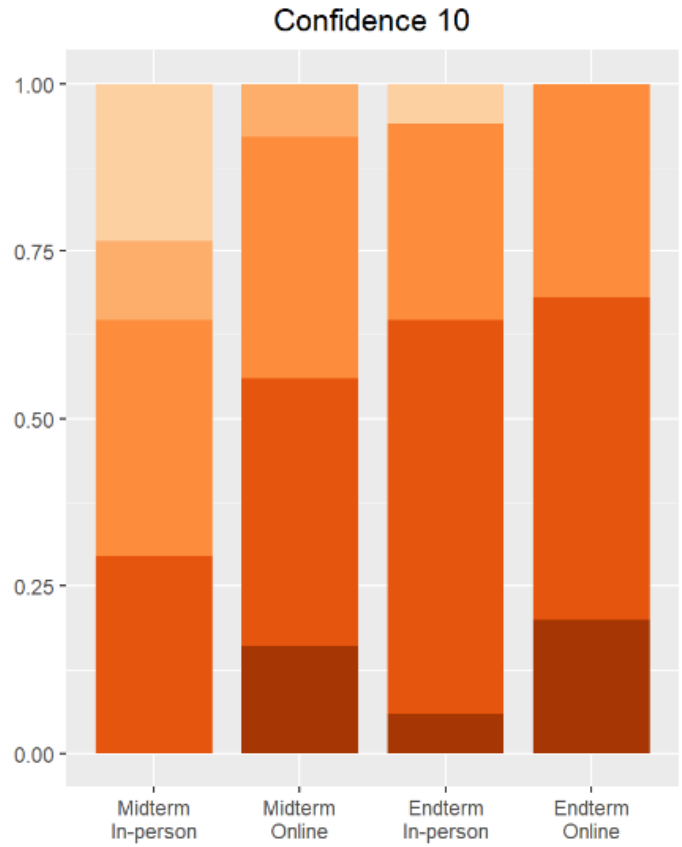
	In-person (N=17)	Online (N=25)	Overall (N=42)
Gender			
0 Female	10 (58.8%)	17 (68.0%)	27 (64.3%)
1 Male	7 (41.2%)	8 (32.0%)	15 (35.7%)
Language			
0 Non-native Eng. Speaker	2 (11.8%)	12 (48.0%)	14 (33.3%)
1 Native Eng. Speaker	15 (88.2%)	13 (52.0%)	28 (66.7%)
Previous Course Taken			
Mean (SD)	0.294 (0.772)	0.400 (0.816)	0.357 (0.791)
Median [Min, Max]	0 [0, 3.00]	0 [0, 3.00]	0 [0, 3.00]
Year Level			
Mean (SD)	1.94 (0.556)	2.32 (0.945)	2.17 (0.824)
Median [Min, Max]	2.00 [1.00, 3.00]	2.00 [1.00, 4.00]	2.00 [1.00, 4.00]
SC0			
Mean (SD)	2.24 (1.03)	2.72 (1.28)	2.52 (1.19)
Median [Min, Max]	2.00 [1.00, 5.00]	3.00 [1.00, 7.00]	2.00 [1.00, 7.00]

Previous Experience SC0

Descriptive Analysis



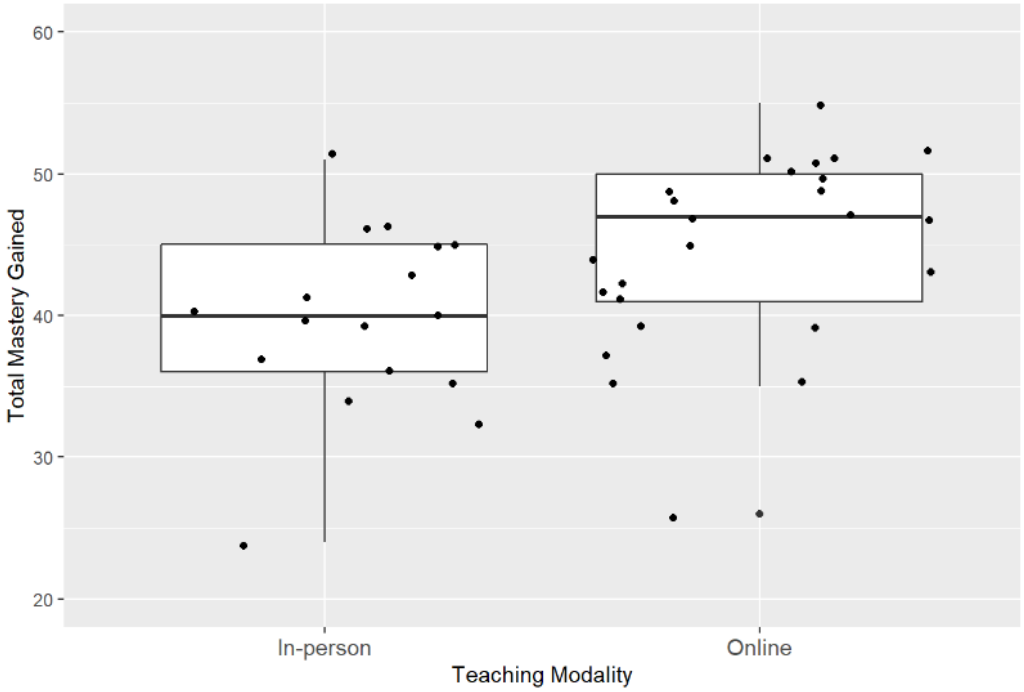
Rate your agreement to the following statements:
I am comfortable learning computer applications in forestry

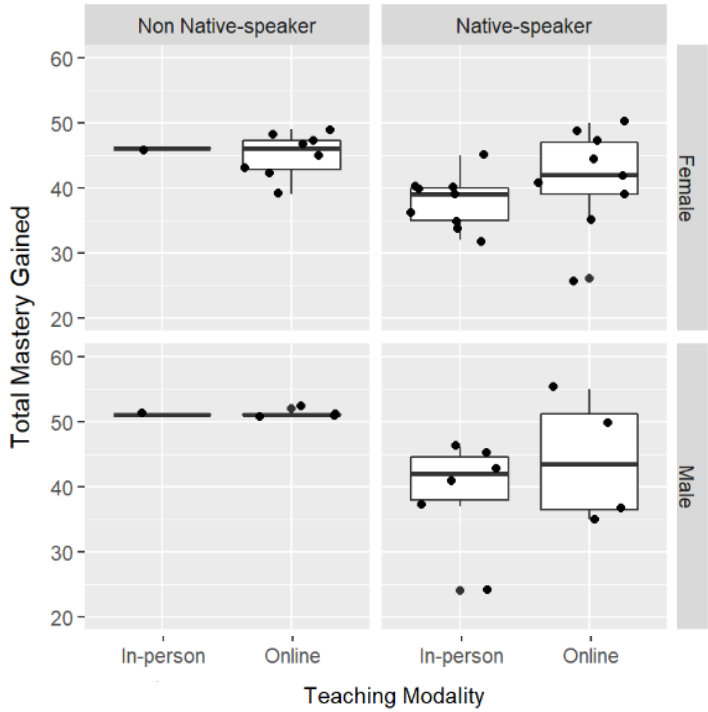


Rate your agreement to the following statements:
I am confident that I can generate data summaries and create compelling visualizations (e.g. graphs or tables)

Descriptive Analysis

Self-reflection of Total Mastery Gained: In-person vs. Online





Analysis and Conclusion

Compared confidence and self-efficacy in groups: midterm vs end-term

1. Wilcoxon paired tests to compare if there is significant difference between midterm and end-term in aspects of each evaluation item in in-person and online groups.

2. Wilcoxon tests to compare if there is significant difference between in-person and online teaching modality in aspects of each evaluation item in midterm and end-term surveys.

Conclusion using p-values:

- Among online group, there is a significant difference on student's confidence level between midterm and end-term for four confidences and other confidences have no differences.

- For most confidence and self-efficacy variables, we don't have enough evidence to reject the null hypothesis that there is no difference between in-person and online group in midterm evaluation.

Analysis and Conclusion

Ordinal logistic regression to predict the mastery levels

Mastery Levels: 0 (not at all confident) to 10 (extremely confident)

Explanatory variables:

- Platform (1: In-person; 2: Online)
- Gender (0: female; 1: male)
- Language (0: Non-native speaker; 1: Native speaker)
- Corresponding experience level (1: No Experience; 2: Some Experience; 3: Proficient)
- Previous experience (variable “SC0” — evaluated by course took before + year level)

Analysis and Conclusion

Fitted model:

Variable	Coefficent Estimate (Standard Error)	P-value
Platform	1.42 (0.688)	0.0392386
Gender	1.4 (0.697)	0.0451031
Native Speaker	0.95 (0.817)	0.2466385
Some Experience/No Experience	0.41 (0.741)	0.5766236
Proficient/ No Experience	0.85 (1.582)	0.5921903
SC0	0.73 (0.378)	0.0528596
Intercept:		
3|5	-0.15 (0.932)	0.9364973
5|6	1.08 (1.773)	0.5413203
6|7	1.7 (1.757)	0.3307912
7|8	3.63 (1.812)	0.0451235
8|9	5.25 (1.903)	0.005758
9|10	7.7 (2.147)	0.0003389

Conclusion from the fitted model:

Variables	OR	Interpretation
Platform	4.13	Online students have 4.13 times higher mastery level than in-person students
Gender	4.04	Male students have 4.04 times higher mastery levels than female students
Native Speaker	2.58	Native English speakers have 2.58 times higher mastery level than non-native speakers
Some Experience/No Experience	1.5	Having some experience shows 1.5 times higher mastery levels than no experience
Proficient/ No Experience	2.33	Proficiency shows 2.33 times higher mastery levels than no experience
SC0	2.08	For one unit increase in student's previous experience, the odds of having higher mastery level is multiplied by 2.08

Summary

1. Confidence levels in most of the learning module increased over the term
2. For most confidence, engagement and self-efficacy variables resulted that there is no difference between in-person and online group
3. Language, previous experience and corresponding experience played an important role for gaining mastery in each learning module.

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Thank You!

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