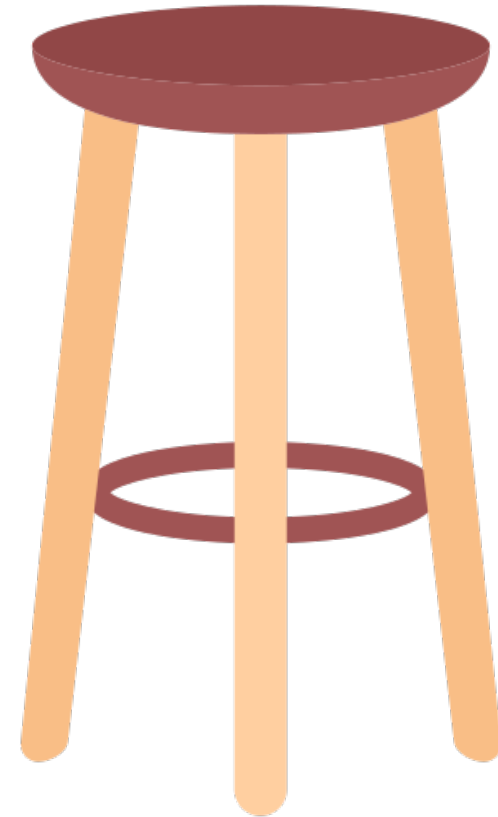


# Active Learning and the Success Stool: A Simple Framework for Continually Improving Teaching

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*Photo Credit: Nikita Golubev (www.flaticon.com)*



**Short  
pre-session  
survey!**

**“Active learning** engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work.”

*Freeman et al. (2014), pp. 8413-8414*

# Why do we care about active learning?

Freeman et al. (2014):

- Average **exam scores improved by 6%** in active learning sections (half a standard deviation)
- Students in traditional lecture sections were **1.5 times more likely to fail**

“If the experiments analyzed here had been conducted as randomized controlled trials of medical interventions, they may have been stopped for benefit...”

*Freeman et al. (2014), pp. 8413*

# How do we **measure** active learning?

- Teaching Dimensions Observation Protocol (TDOP)
- Reformed Teaching Observation Protocol (RTOP)
- Classroom Observation Protocol for Undergraduate STEM (COPUS)
- Practical Observation Rubric to Assess Active Learning (PORTAAL)

Can we do this more efficiently?

**Yes!**

# DART

**Decibel Analysis for Research in Teaching (DART)** is a software tool that analyzes classroom sound to predict with ~90% accuracy the quantity of time spent on Single Voice (e.g. lecture), Multiple Voice (e.g. pair discussion), and No Voice (e.g. clicker, question thinking) activities.

## Welcome

Email address

bsheridan4@elon.edu

Password

.....

Login

[Register](#) | [Forgot password?](#)

## What can DART do?



# DART Class Audio Analyzer v1.2 beta

Click to select or drag and drop your class recording audio file into the box below to see a visualization of the waveform and DART predictions. The calculated percentages are not valid if your recording includes noise from before class, after class, or breaks.

Analyze your classroom audio recording

**Choose a file** or drag it here

DART accepts MP3, MP4, M4A, M4P, and WAV file formats.

For more information, please see: [Owens, Seidel, Wong et al. 2017. Classroom Sound Can Be Used to Classify Teaching Practices in College Science Courses. PNAS.](#)

🔗 Need help? 🤝 Want to collaborate?

✉ Contact Us!



# How did they do it?

- Machine- learning-derived algorithm
- Used DART on 1486 recordings of class sessions from 67 courses; 1,720 hours of audio
- Analyzes volume and variance of audio recordings to predict time spent in:  
single voice (S), multiple voice (M), no voice (N)



# How did they do it?

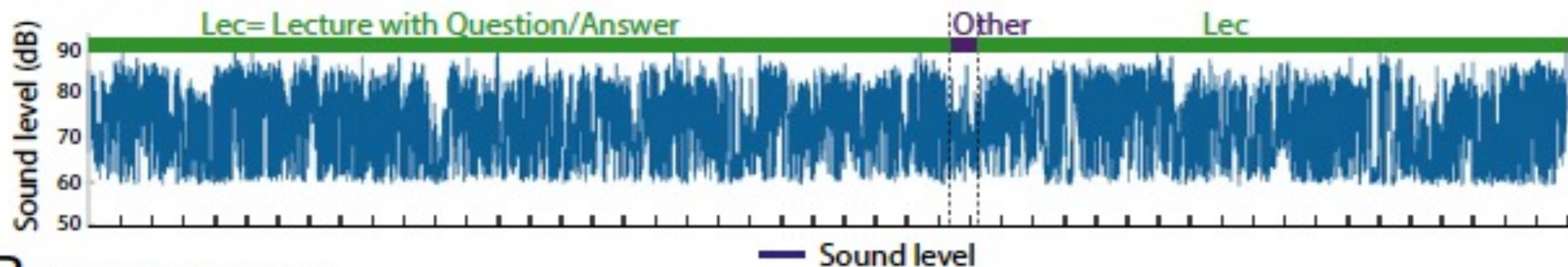
Classroom observation tools showed:

- high noise levels, e.g. think-pair-share, cooperative learning, etc.
- low noise levels, e.g. clickers, minute papers, etc.

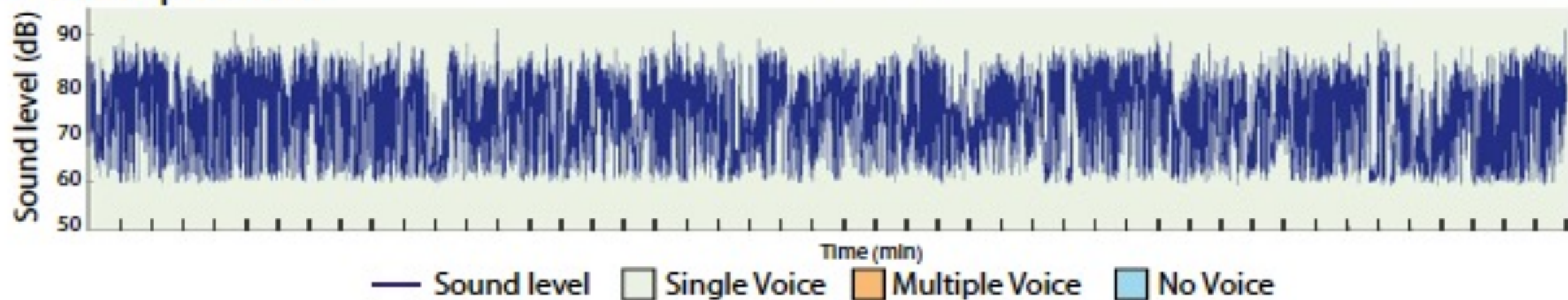
Plausibly implies that **variation in noise level indicates variation in pedagogy**

## Class session with only lecture and question/answer

### A Human annotation

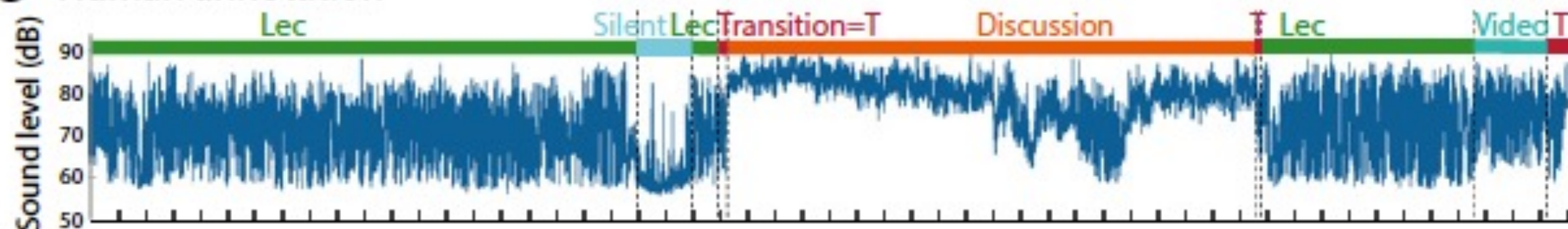


### B DART prediction

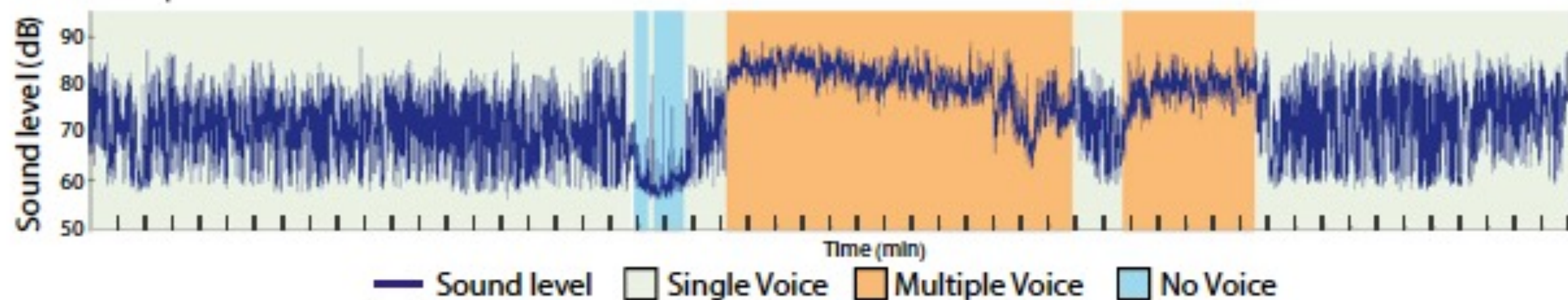


## C Class session with varied learning activities

C Human annotation

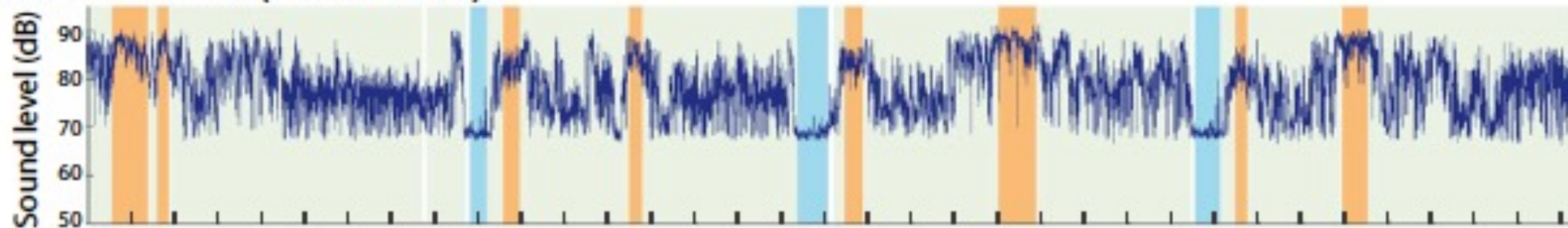


D DART prediction

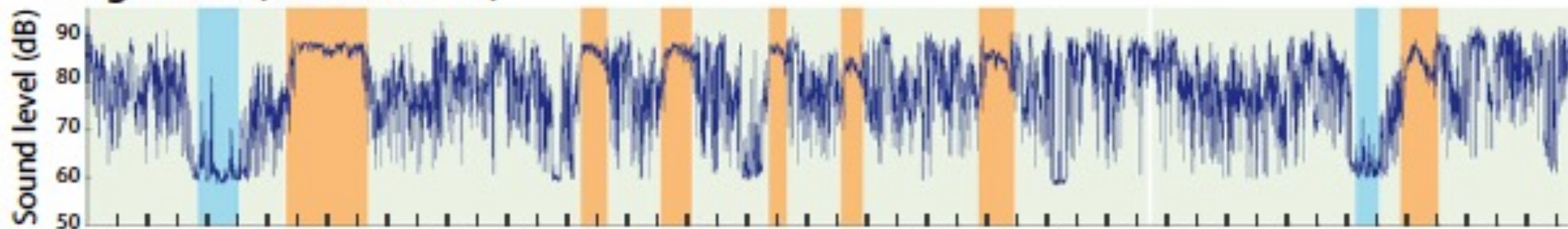




**E Small class (15 students)**



**F Large class (287 students)**



# How did I (and my coauthor) do it?

- Several course types from Business School:
  - Principles of Economics
  - Intermediate Micro./Macro. Econ.
  - Business Stats
  - Principles of Accounting
  - Intermediate Acct.
  - Upper-level Management, Entrepreneurship, & Marketing courses

## Table 1: DART Summary Statistics

	Single	Multiple	None
Avg. Percentage	<b>89.0%</b>	9.4%	1.6%
(Std. Dev.)	(7.2%)	(6.3%)	(2.3%)
Median Percentage	90.1%	7.9%	0.6%
Total Class Sessions	535		
Unique Instructors	30		

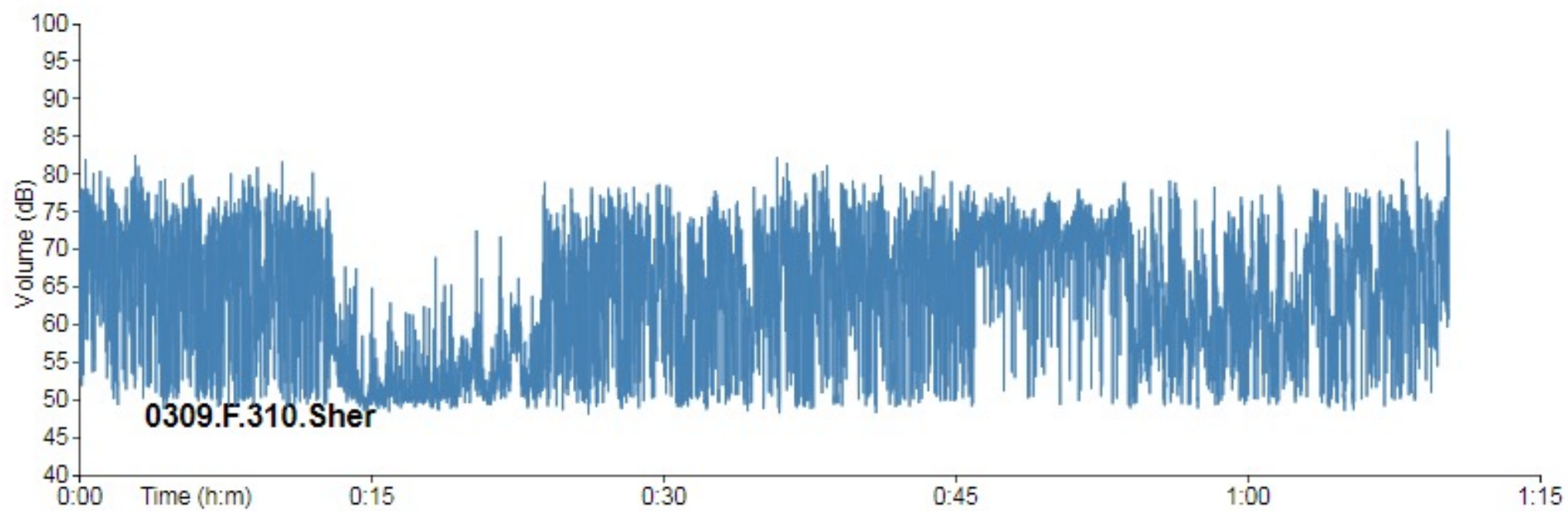
DART



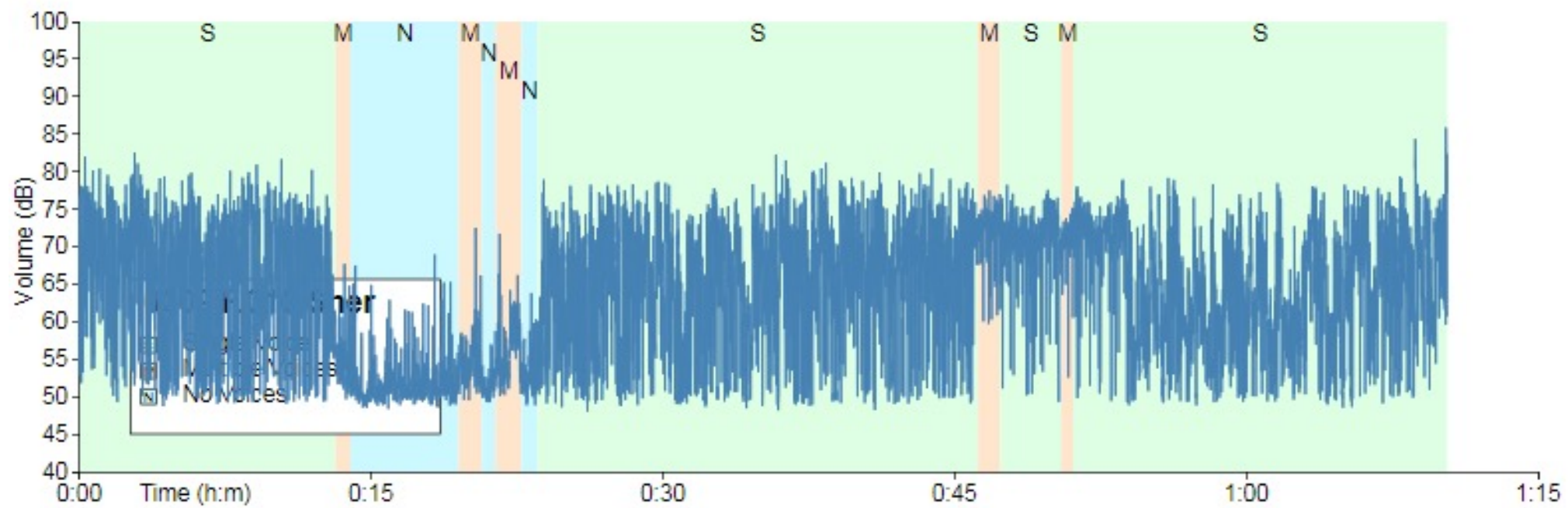
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**0309.F.310.Sher Waveform:**

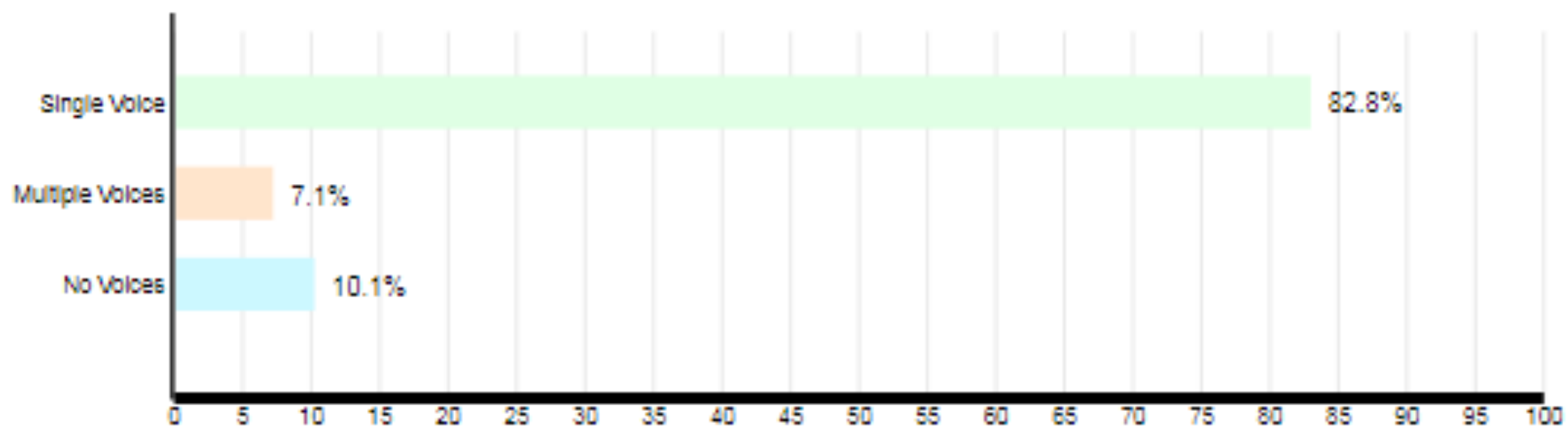


**0309.F.310.Sher DART Predictions:**

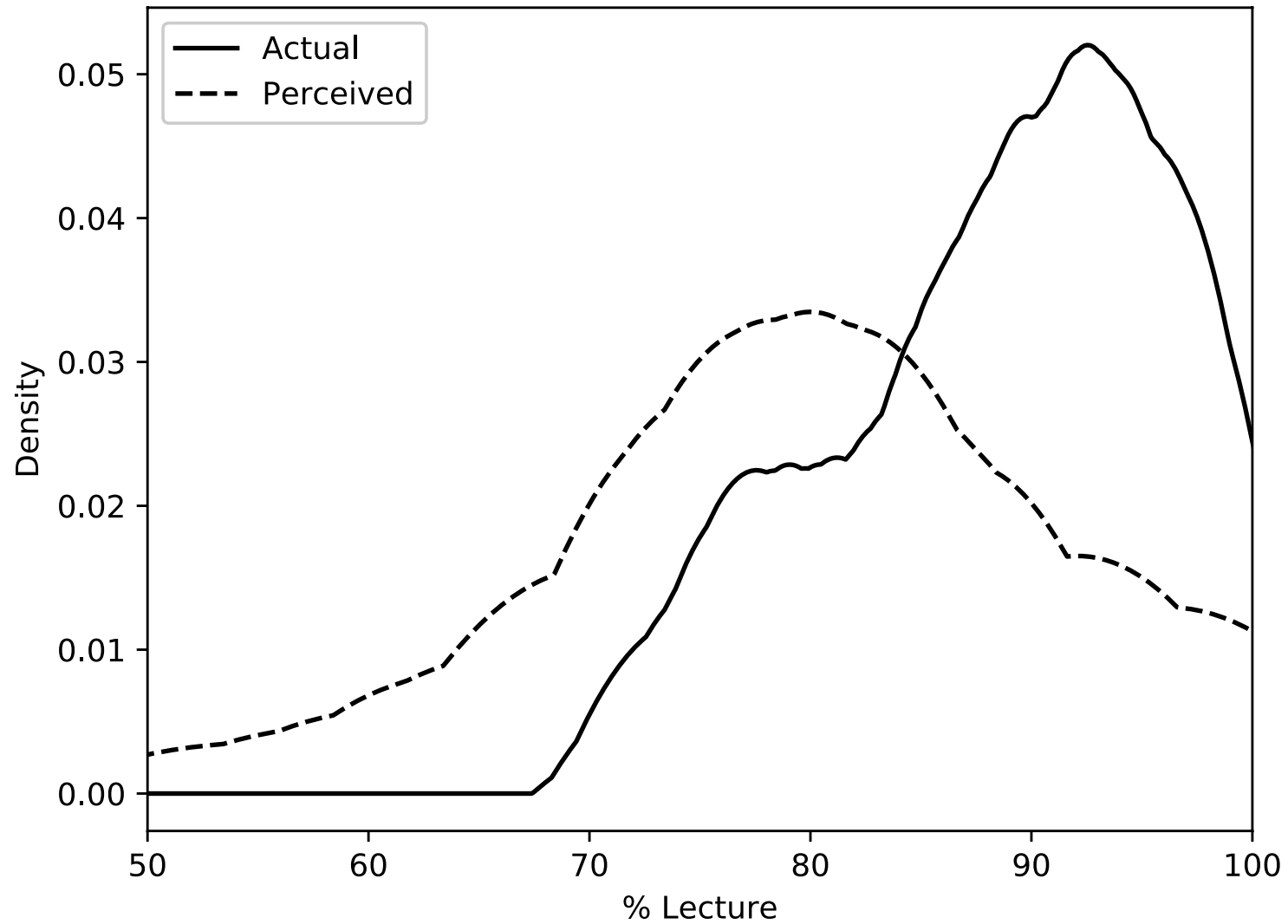




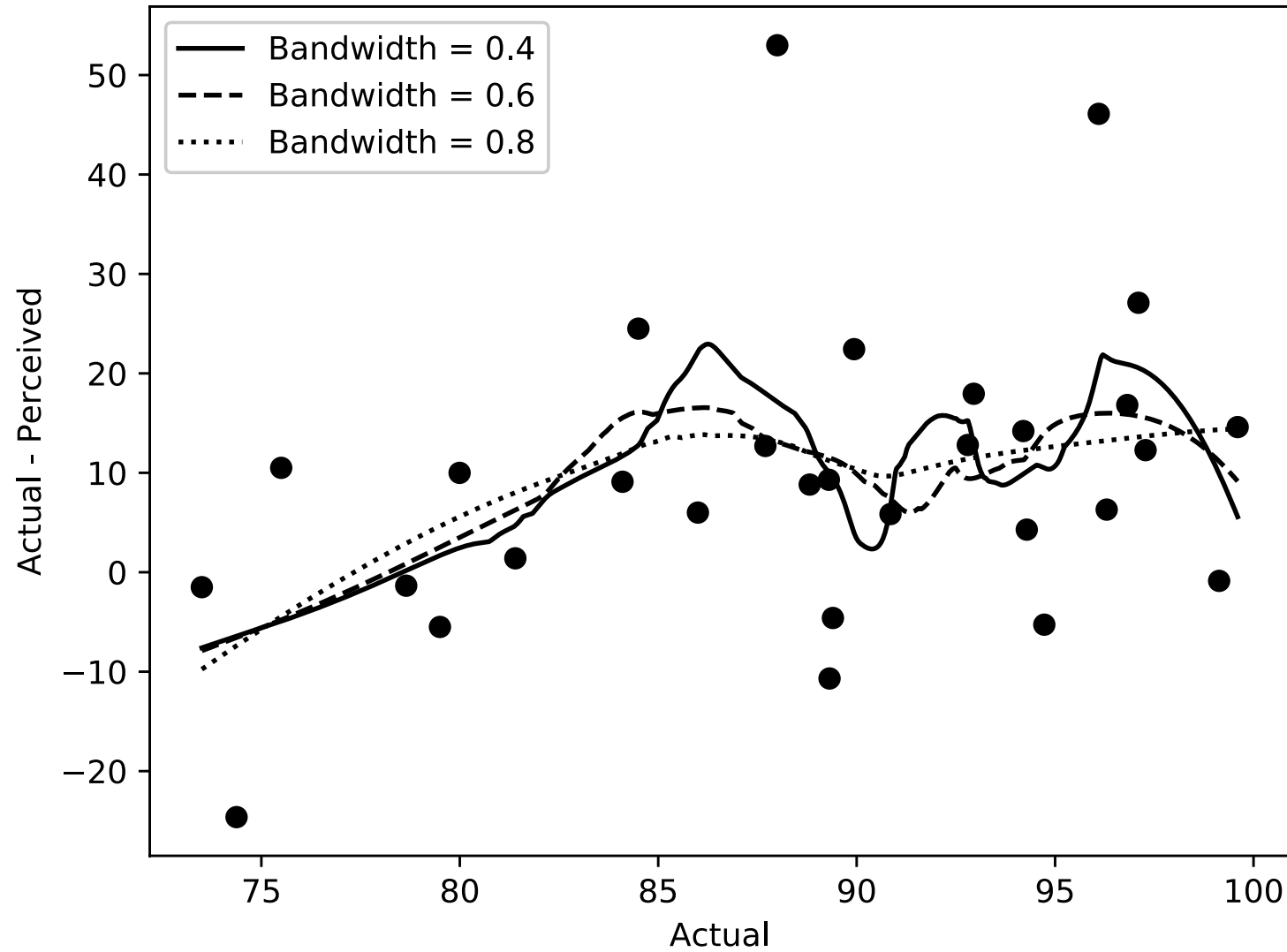
### 0309.F.310.Sher Quantitative DART results<sup>\*</sup>



# Kernel Density Estimate of Actual vs. Perceived Lecturing



# LOESS Curves of Actual vs. (Actual – Perceived) Lecturing



**Table 2: DART Output: Perception vs. Reality**

Learning Type:	Reality	Perception	Gap
Passive (Avg.)	89.0	78.5	10.5
Passive (Med.)	90.1	80.0	11.1
Active (Avg.)	11.0	21.5	-10.5
Active (Med.)	8.5	20.0	-11.5

**Table 2: DART Output: Perception vs. Reality**

Learning Type:	Reality	Perception	Gap
Passive (Avg.)	89.0	78.5	<b>10.5***</b>
Passive (Med.)	90.1	80.0	11.1
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### Table 3: Faculty Survey

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#### Diminishing Returns to: Passive Learning

$\leq 20 \text{ mins}$  48%

$\leq 30 \text{ mins}$  26%

$\leq 40 \text{ mins}$  26%

#### Active Learning

$\leq 20 \text{ mins}$  72%

$\leq 30 \text{ mins}$  17%

$\leq 40 \text{ mins}$  11%

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## Table 3: Faculty Survey

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### Diminishing Returns to: Passive Learning

$\leq 20 \text{ mins}$  **48%**

$\leq 30 \text{ mins}$  26%

$\leq 40 \text{ mins}$  26%

### Active Learning

$\leq 20 \text{ mins}$  **72%**

$\leq 30 \text{ mins}$  17%

$\leq 40 \text{ mins}$  11%

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**Why do we care** about active learning?

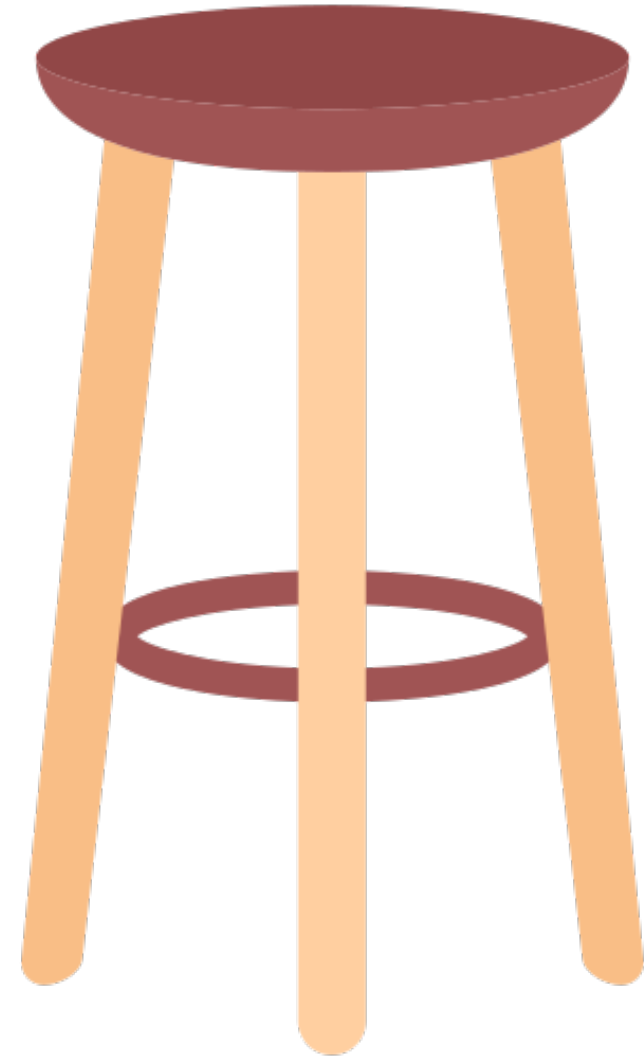
It works.

But we need to be more consistent in implementation.

How?



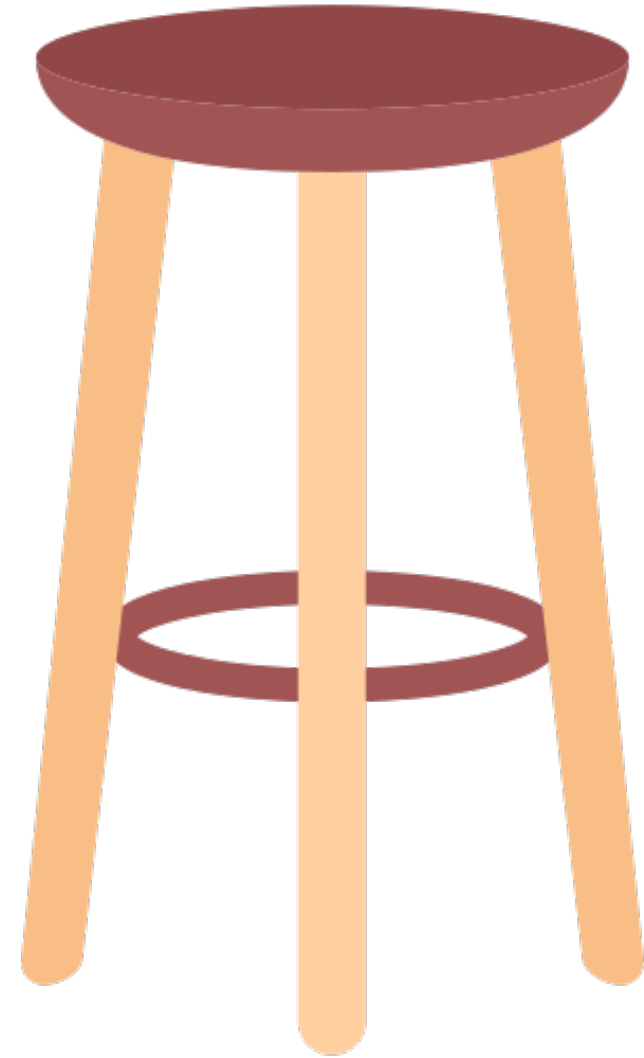
# **The Success Stool: A Simple Framework for Continually Improving Teaching**



1.Semester Plan

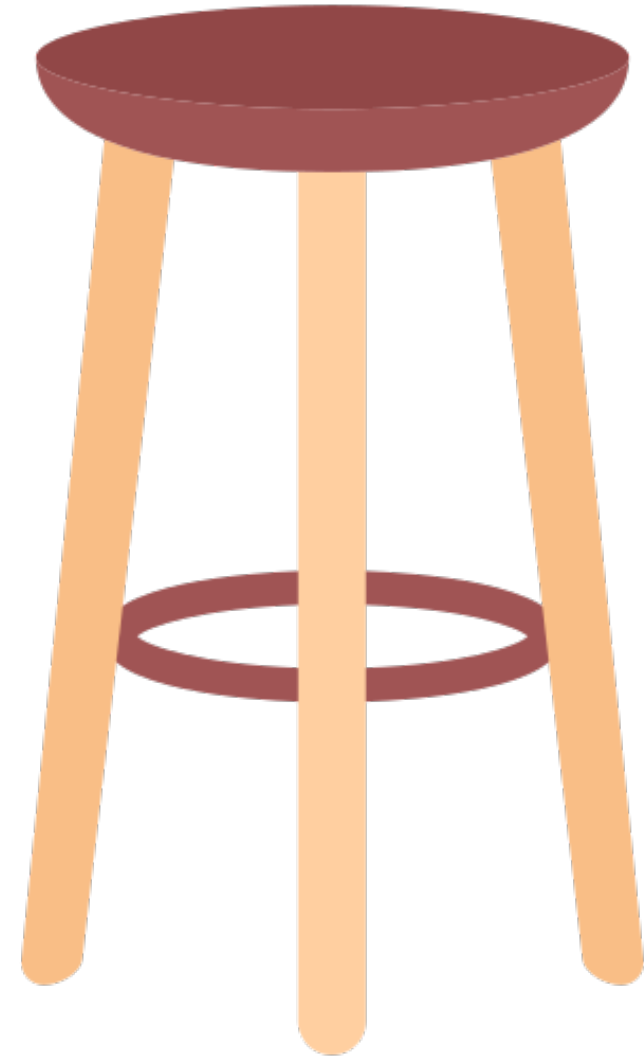
2.Weekly Reflection

3.Accountability Partner  
(Critical Friend)



# 1. Semester Plan: WHY?

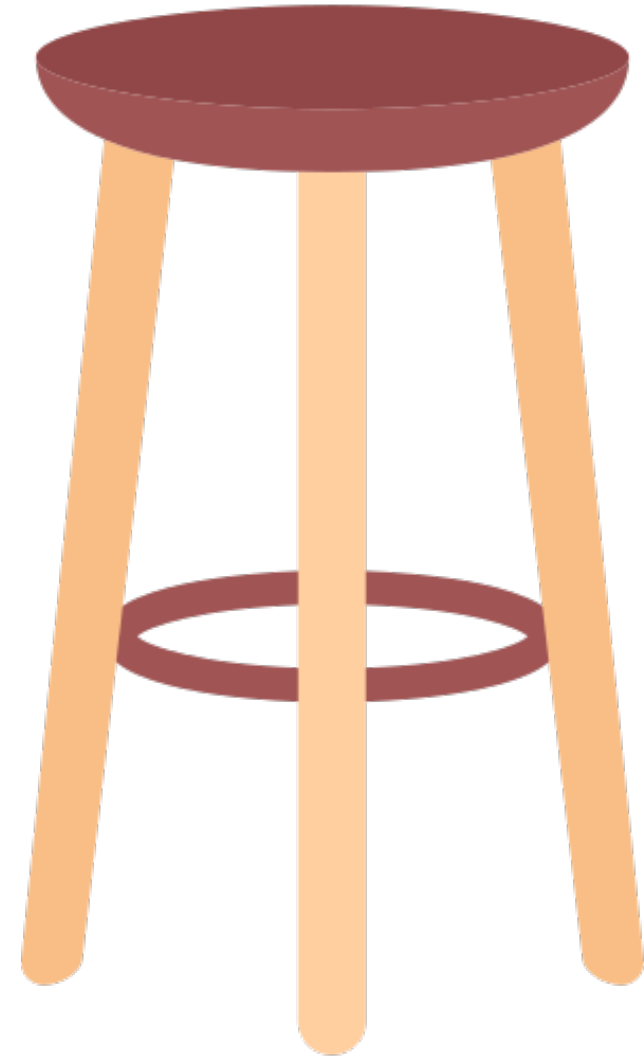
- Precommitment device
- Reduces cognitive load



# 1.Semester Plan: HOW?

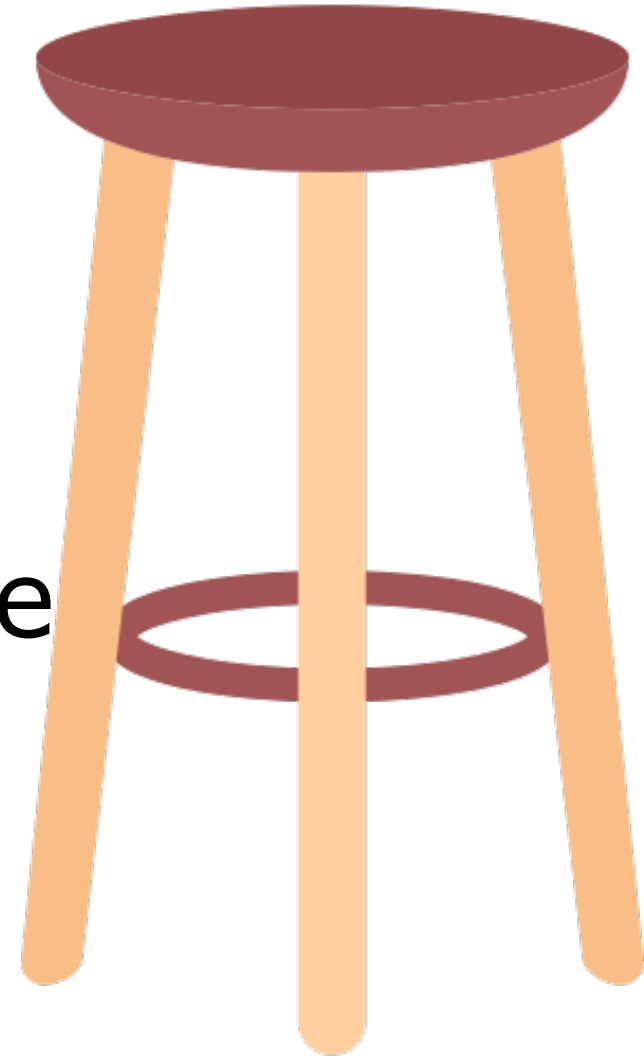
*Interactive Lecturing,*  
Barkley & Major (2018)

ICAP Framework,  
Chi & Wylie (2014)



# 1. Semester Plan: HOW?

- Identify learning goals
- Identify a pedagogy style
- Assessments
- Situational factors



Week	Day	Date	Class Topic	MJ	HW	TBL	NOTES
1	Sunday	30-Jan					
	Monday	31-Jan					
	Tuesday	1-Feb	Ch. 1: Intro to the Macroeconomy	1			
	Wednesday	2-Feb					
	Thursday	3-Feb	Ch. 1: Intro / Ch. 8: Price Level		1		
	Friday	4-Feb					
	Saturday	5-Feb					
2	Sunday	6-Feb		1			
	Monday	7-Feb					
	Tuesday	8-Feb	Ch. 8: Price Level	2	1	1	
	Wednesday	9-Feb					
	Thursday	10-Feb	Ch. 8: Price Level./Ch. 7: Unemployment				<a href="https://www.brookings.edu/blog/the-avenue/2022/01/11/decembers-jobs-report-reveals-a-growing-racial-employment-gap-especially-for-black-women/">https://www.brookings.edu/blog/the-avenue/2022/01/11/decembers-jobs-report-reveals-a-growing-racial-employment-gap-especially-for-black-women/</a>
	Friday	11-Feb					

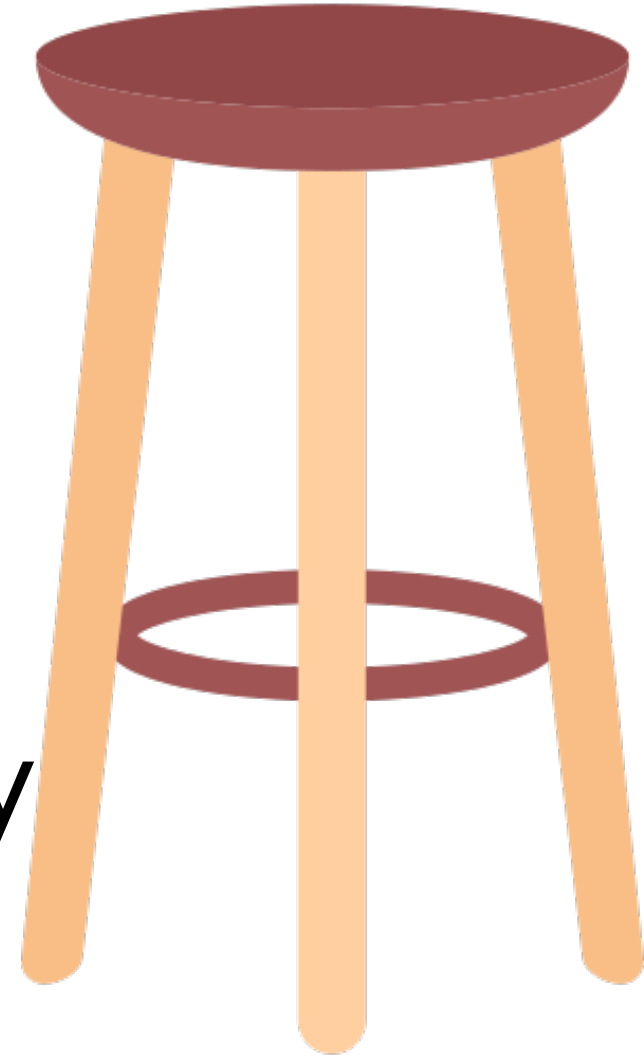
**⊕ Tuesday**

Daily/Weekly Learning Outcomes:		
Segment	Time estimate	Activities and Tasks
Pre-class work	Varies	Read: Ch. 1
First segment	20 min	<ul style="list-style-type: none"><li>Intro to the class and brief discussion of the syllabus</li><li><u>MacroJournals</u> → Show examples and walk students through how to do it (especially with new template (be sure to post it to Moodle)</li></ul>
Second segment	30 min	<ul style="list-style-type: none"><li>Ch. 0 slides – perceptions about current issues: inflation and uptick in quits (strong labor mkt)</li><li>Poll Everywhere – demographic information folder</li><li>Poll Everywhere to ask students their opinions first, then show slide with economists' opinions</li></ul>
BREAK	5 min	
Third segment	15 min	<ul style="list-style-type: none"><li>Ch. 1 slides – general intro to the economy in the U.S. and beyond</li></ul>
Fourth segment	20 min	<ul style="list-style-type: none"><li>Discussion of recent applications of economics: <u>e.g.</u> Opportunity Atlas, etc.</li><li>Set up class for discussion of inflation and labor markets next week</li></ul>
Fifth segment	5 min	Reminder about FIRST MJ DUE SUNDAY Leave a few minutes early on this day if there is any time left after <u>all</u> of the previous activities

## 2. Weekly Reflection:

WHY?

- We are forgetful
- We want to continually improve

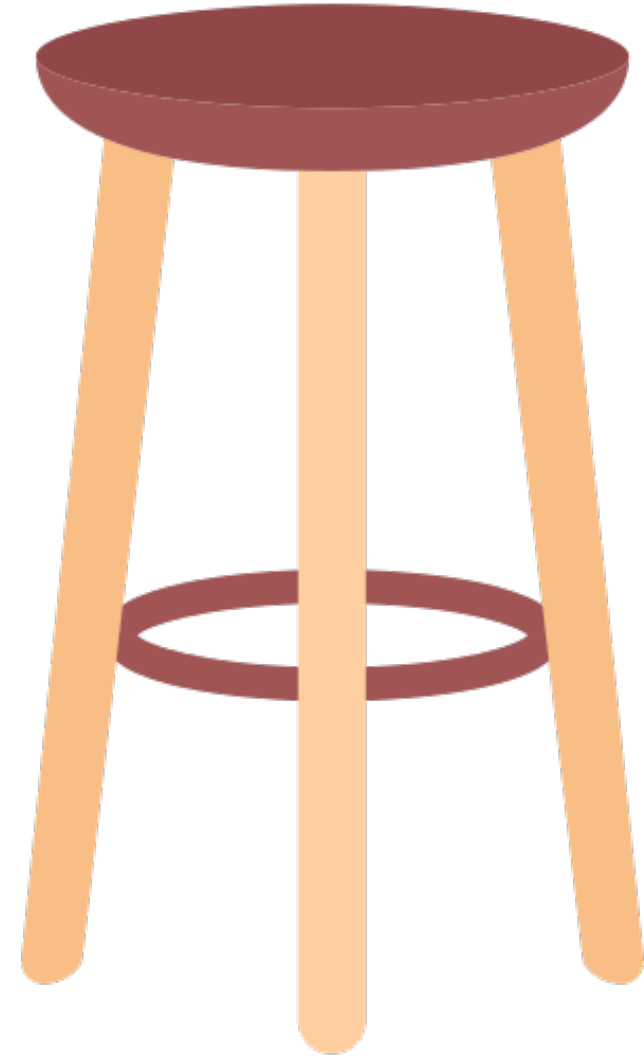




## 2. Weekly Reflection: HOW?

(10 mins)

- Rose
  - Thorn
  - Bud
- (Ways to Improve)



## Weekly Class Reflection – Macro (Feb. 7- Feb. 11)

Overall Assessment of the week:

\_\_\_ Exceptional      x Great      \_\_\_ Good      \_\_\_ Fine      \_\_\_ Bad      \_\_\_ Awful

Rose:

TBL's. The students struggled with the iRAT portion, but the AE went very well. I had to go into the weeds of the latest CPI report (released the same day as our class). They found this interesting, and I think it gave them a better appreciation for who inflation impacts and how different it can be across categories.

Thorn:

Nothing really. Maybe timing. I hoped to finish the inflation chapter but didn't quite get there.

Ways to improve next time:

This week honestly went well. There was a little confusion over the money supply measures (M1, M2) and how they related to the quantity equation. It would be good to connect those a little better next time. There was also a disconnect because we had not yet discussed short run vs long run. I usually cover this in earlier chapters, but we covered the inflation chapter first because of it being a hot topic now. It's fine, but I think the idea of classical dichotomy and monetary neutrality were a little too nuanced for them.

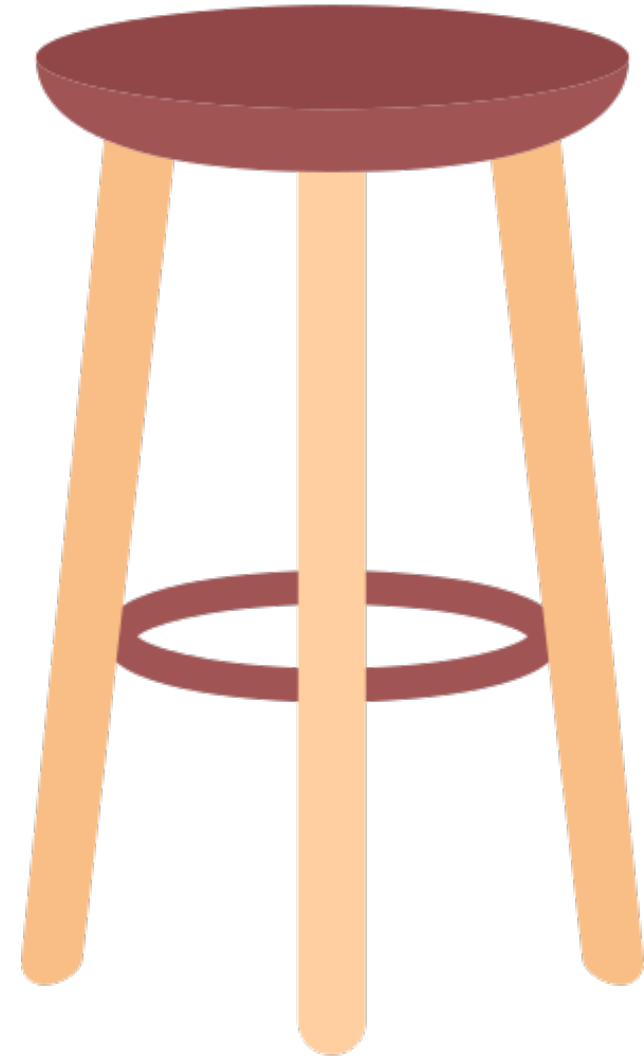
General Comments:

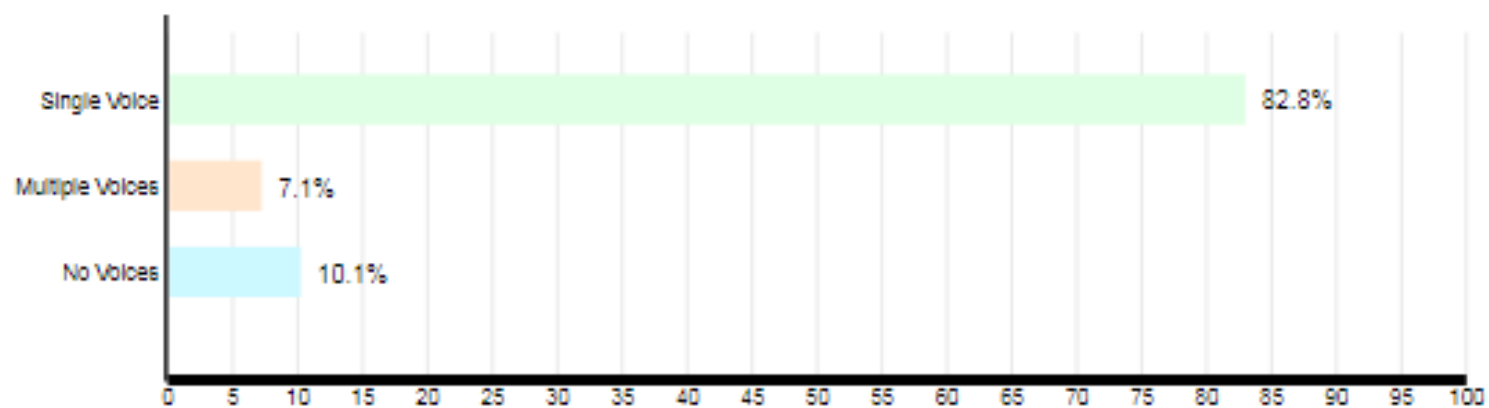
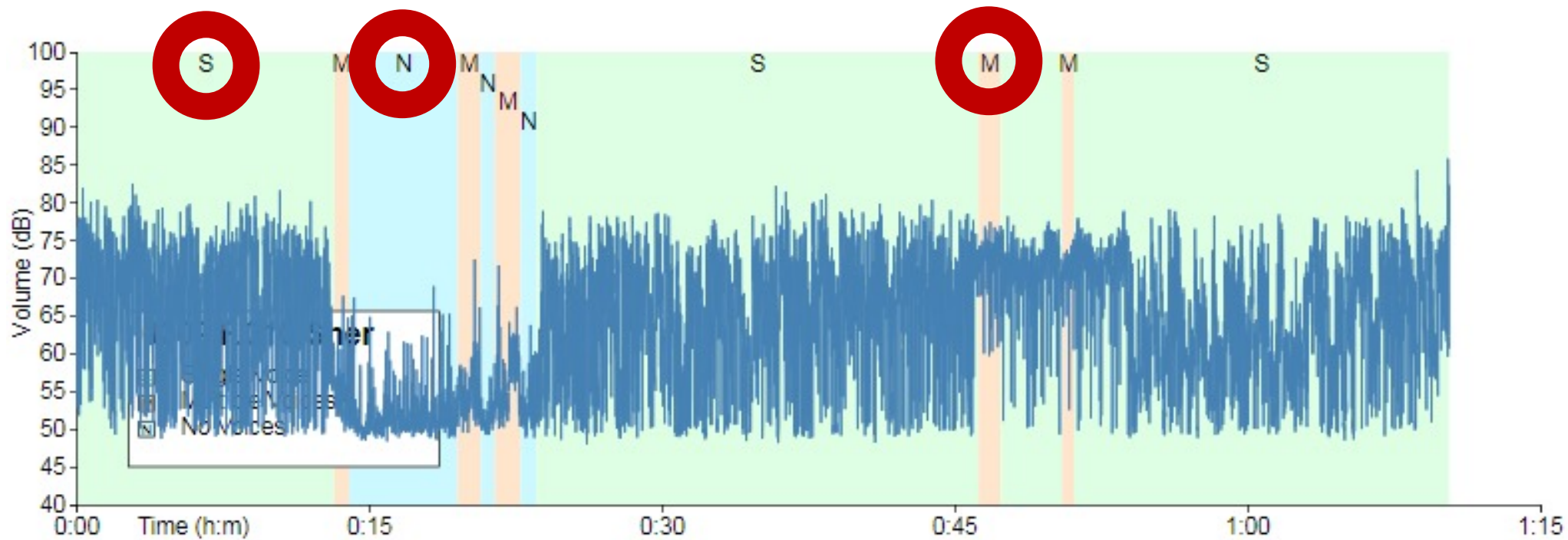
Things are going well. The MacroJournals have also been going ok and our first discussion

## 2. Weekly Reflection: HOW?

- DART (slightly more advanced)

10 minutes





DART

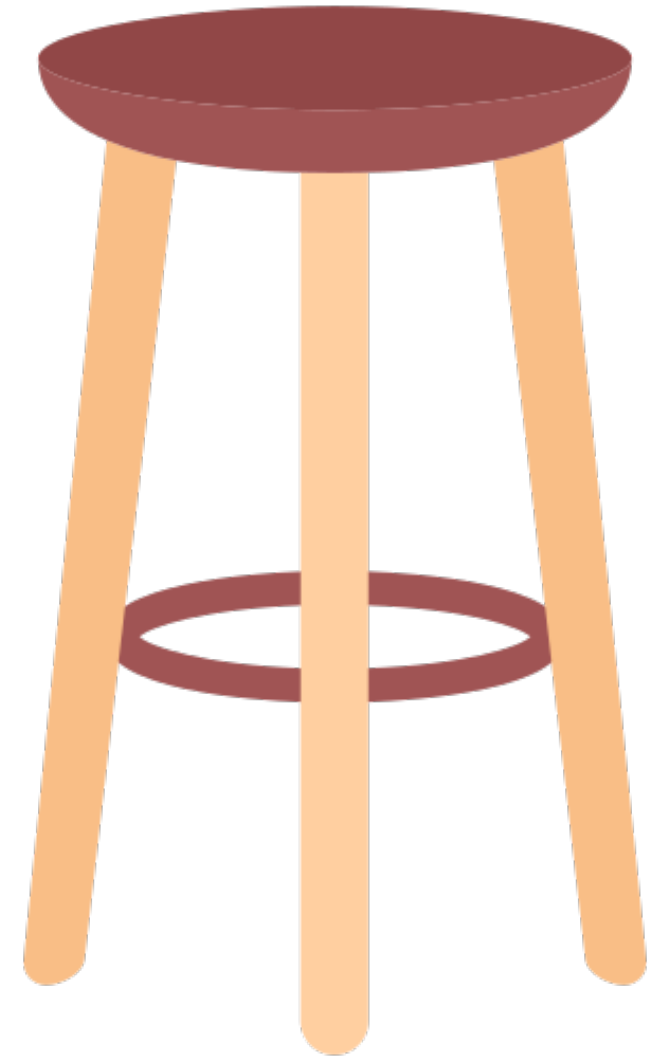


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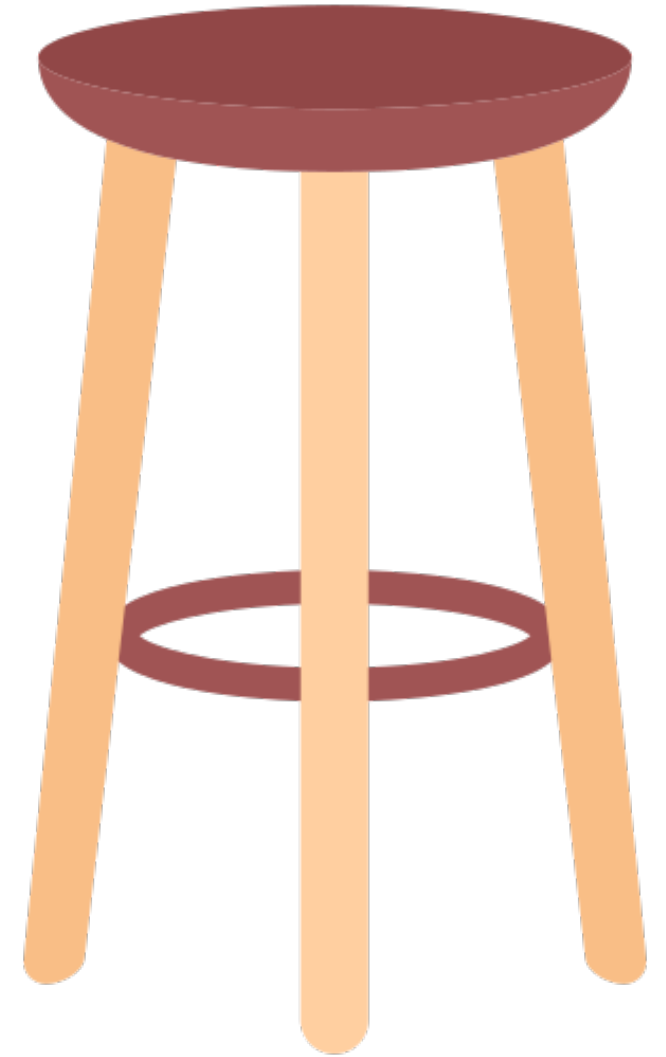
### 3. Accountability Partner: WHY?

- We perform better when we're accountable
- We want to continually improve



### 3. Accountability Partner: HOW?

- Non-evaluative
- Close-ish to your discipline (enough to ask informed questions)



# Discussion & Questions

## Summary:

- We are not as active as we think we are (or as we should be)
- Success Stool:
  - 1) semester plan
  - 2) weekly reflection
  - 3) accountability partner

# CONNECT!



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