See you / see me:
An interactive real-time online course

Mine Çetinkaya-Rundel

Department of Statistical Science

background

data analysis and statistical inference

"lecture" (2/week) + computing lab (1/week)

required for (some) SS majors

increasing demand ↓ larger class sizes

on campus summer sta 101

study abroad + other demands/ engagements

sta 104:
data analysis
and statistical
inference
(online)

online version
of sta 101

summer 2013
and 2014,
session 1

motivation:
create a course that is the same
(or as similar as possible)
content / quality / pedagogy / rigor

MOOC

SCOC?

Video

Mine Cetinkaya-Rundel (internal)

Bootstrapping

Rent in Durham - bootstrap interval

The dot plot below shows the distribu
samples from the original sample. Es
dence interval based on this bootstrap

90%

5%

900 1000 1100 1200 1300 1400

Statistics 104 (Mine Çetinkaya-Rundel) U4 - L1: Bootstrap, paired, and two sample June 3, 2013 7 / 22

Video

cece Mercer

Video

daryn

Video

Lili Ramirez

Video

Shelby Hart-Armstrong

Video

Sophie Cummins

Video

Thomas Meister

Duke UNIVERSITY

students

2013:
7 students

First-year: 4
Sophomores: 2
Junior: 1
Senior: 0

2014:
11 students

First-year: 0
Sophomores: 4
Junior: 5
Senior: 2

most majoring in PubPol

some dropped sta 101 during regular session due to work load

some enjoy taking online courses

others avoiding taking course during regular session or need to meet requirements before fall

logistics

virtual daily meetings on WebEx Training Center (recorded)

90 min / day
5 days / week

"lecture" + lab

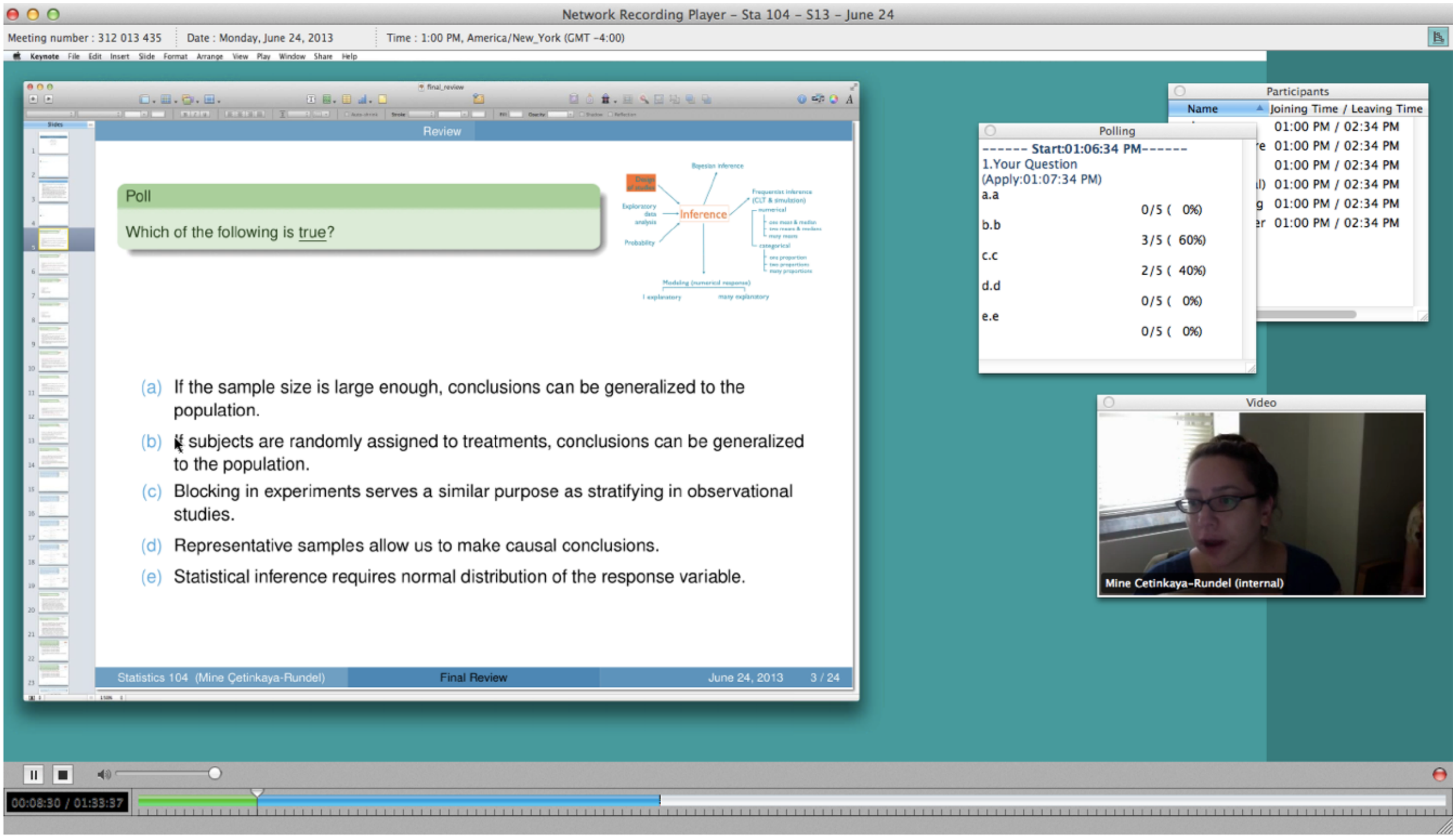
breakout sessions

assignments and forums (Piazza) on Sakai

materials on public course website

videos hosted on YouTube (temporary solution)

logistics


Network Recording Player – Sta 104 – S13 – June 24
Meeting number : 312 013 435
Date : Monday, June 24, 2013
Time : 1:00 PM, America/New_York (GMT -4:00)
Review
Poll
Which of the following is true?
(a) If the sample size is large enough, conclusions can be generalized to the population.
(b) If subjects are randomly assigned to treatments, conclusions can be generalized to the population.
(c) Blocking in experiments serves a similar purpose as stratifying in observational studies.
(d) Representative samples allow us to make causal conclusions.
(e) Statistical inference requires normal distribution of the response variable.
Statistics 104 (Mine Çetinkaya-Rundel)
Final Review
June 24, 2013
3 / 24
Participants
Name
Joining Time / Leaving Time
01:00 PM / 02:34 PM
Polling
------ Start:01:06:34 PM------
1.Your Question
(Apply:01:07:34 PM)
a.a 0/5 (0%)
b.b 3/5 (60%)
c.c 2/5 (40%)
d.d 0/5 (0%)
e.e 0/5 (0%)
Video
Mine Cetinkaya-Rundel (internal)
00:08:30 / 01:33:37

logistics

Duke
UNIVERSITY

Department of
Statistical Science

home
syllabus
schedule
resources
support
links
faq

Sta 104 - Data Analysis and Statistical Inference - Online (Summer 2014)
Dr. Çetinkaya-Rundel

Tentative schedule:

Unit	Date	Topics	Slides / App. Ex. / Lab	Prep	Notes
Unit 1	Wed, 5/14	Introduction + Data collection	Lec 0 + Lec 1.1 + App 1.1	Unit 1 resources	Complete survey + prete
Unit 1	Thur, 5/15	Observational studies & experiments	Lec 1.2 + App 1.2		RA 1 in class (practice)
Unit 1	Fri, 5/16	Introduction to R	Lab 0 + Lab 1		
	Sat, 5/17				
	Sun, 5/18				PS 1 due
Unit 1	Mon, 5/19	Exploratory data analysis	Lec 1.3 + App 1.3		
Unit 2	Tue, 5/20	Introduction to statistical inference	Lec 1.4 + App 1.4		PA 1 due (Practice)

logistics

Introduction

Part 1: Designing studies

(1) Data basics

pre-course meeting

last week of classes

meet & greet

technical details

course format

flipped + team-based

7 learning units

pre-unit preparation: videos + learning objectives + textbook

unit

readiness assessment: individual, then team

lecture, with polling questions

application activities in breakout sessions

performance assessment

course format

Unit 5 - Inference for categorical variables

Suggested reading: OpenIntro Statistics, Chapter 6

Suggested exercises:

* *Part 1 - Single proportion: 6.1, 6.3, 6.5, 6.9, 6.11, 6.15, 6.21*
* *Part 2 - Comparing two proportions: 6.23, 6.25, 6.27, 6.29, 6.31, 6.33, 6.35*
* *Part 3 - Inference for proportions via simulation: 6.47, 6.49, 6.51*
* *Part 4 - Comparing three or more proportions (Chi-square): 6.37, 6.39, 6.41, 6.43, 6.45*

---

* *Suggested Reading: Section 6.1 of OpenIntro Statistics*

LO 1. Define population proportion p (parameter) and sample proportion $\hat{p}$ (point estimate).

LO 2. Calculate the sampling variability of the proportion, the standard error, as

$$SE = \sqrt{\frac{p(1-p)}{n}},$$

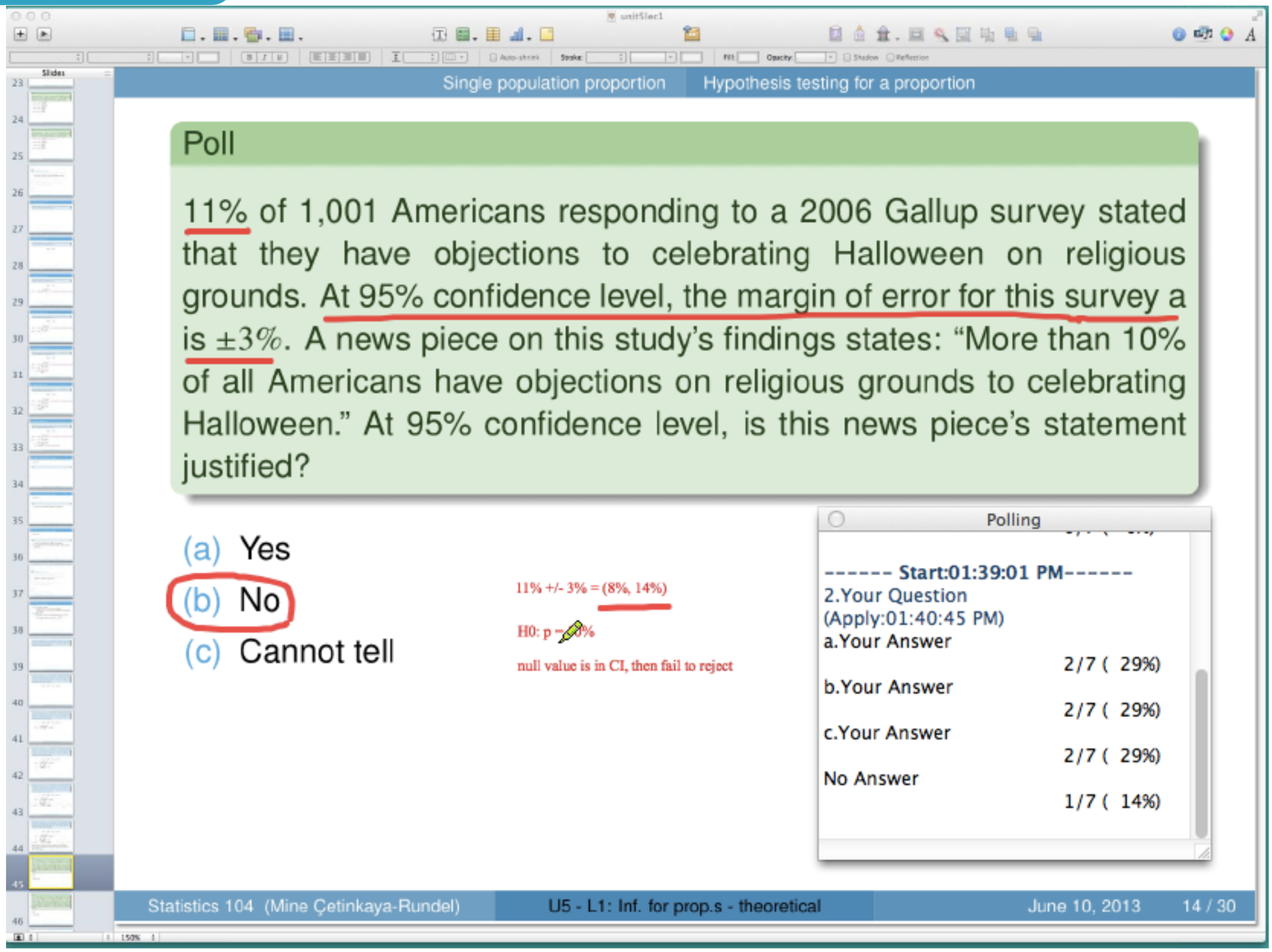
where p is the population proportion.

- Note that when the population proportion p is not known (almost always), this can be estimated using the sample proportion, $SE = \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$.

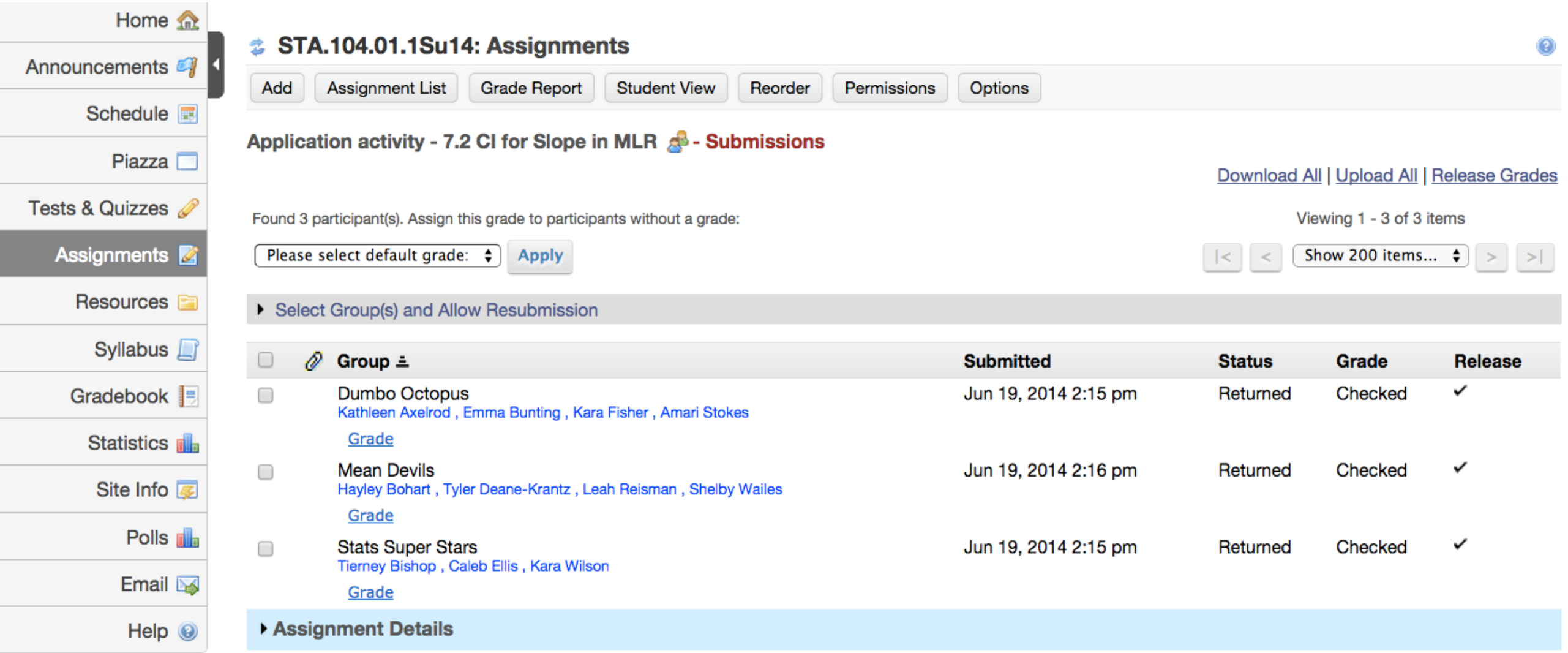
LO 3. Recognize that the Central Limit Theorem (CLT) is about the distribution of point estimates, and that given certain conditions, this distribution will be nearly normal.

- In the case of the proportion the CLT tells us that if
(1) the observations in the sample are independent,
(2) the sample size is sufficiently large (checked using the success/failure condition: $np \geq 10$ and $n(1-p) \geq 10$),
then the distribution of the sample proportion will be nearly normal, centered at the true population proportion and with a standard error of $\sqrt{\frac{p(1-p)}{n}}$.

course format



course format



course format

Test the hypothesis $H_0 : \mu = 10$ vs. $H_A : \mu > 10$ for the following 8 samples. Assume $\sigma = 2$.

$n = 30$	Jacob	Shelby	Daryn
$\bar{x}$	10.05	10.1	10.2
$p - value$			

$n = 5000$	Thomas	Cece	Lili
$\bar{x}$	10.05	10.1	10.2
$p - value$			

support

office hours twice a week on WebEx

summer 2014: TA through BASS Online Apprentice Program

impromptu meetings on Google Hangouts

student formed study groups on Google Hangouts

student feedback

13/16
pace is
about right

9/16
learned most
in sync.
sessions

"I like the convenience of the online class but also the web chat structure makes it feel as if you are actually in a classroom. So it is the best of both worlds."

"I really enjoy the videos! They are a very helpful learning tool. It is also nice to have them to go back to at any time to clear up a concept."

"I like that the class is discussion-based an interactive. I enjoy working with my classmates on application exercises and we are able to explain concepts to each other in terms that we understand. I also like the various polls that we do during lectures because they keep you engaged and you can learn a lot from hearing other students explain the reasoning behind their answers."

great experience ✔

synchronous sessions worthwhile ✔

assessment submission and grading on Sakai ✔

teams on Sakai for application activity submission & reveal ✔

performance assessments ✔

scalable ?

exams on Sakai ?

one-on-one student support ?

WebEx for teaching 😀

video feed from students

polling

recording

Training Center: breakout sessions

WebEx
for teaching

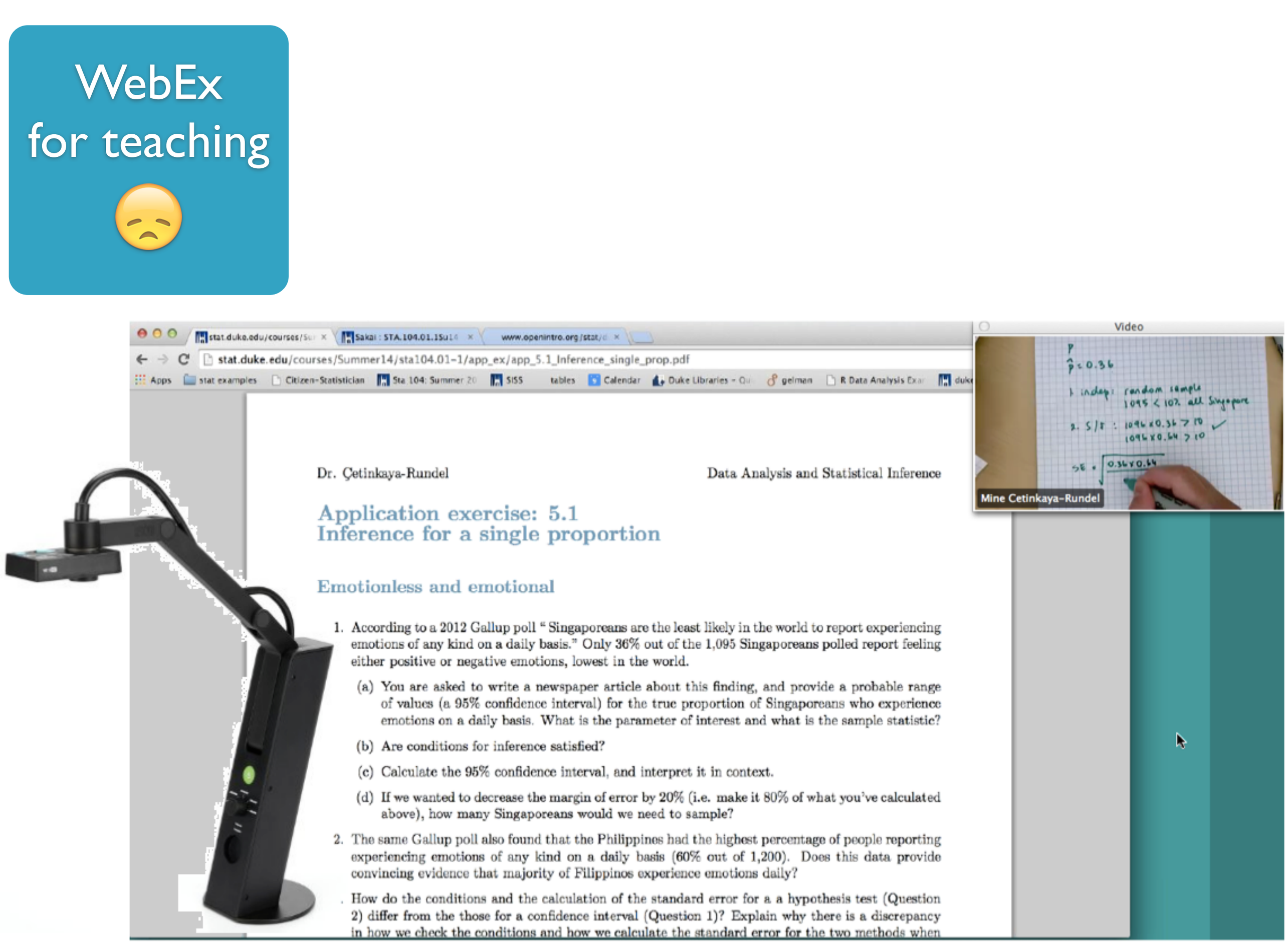
video feeds
limited to 6

annotation
tool buggy
[DocCam]

no auto
recording +
video
streaming
slow

proctoring
exams
[Lockdown
browser +
Video]

WebEx for teaching



[Technical]

don't need to be tech savvy, but should be flexible

remember to record [if not automatic]

especially if class size is large, a tech assistant (at least) first few days

on call tech help throughout course

thank you!

questions?