



Sabbatical Episode I: A New Hope for Traditional Teaching

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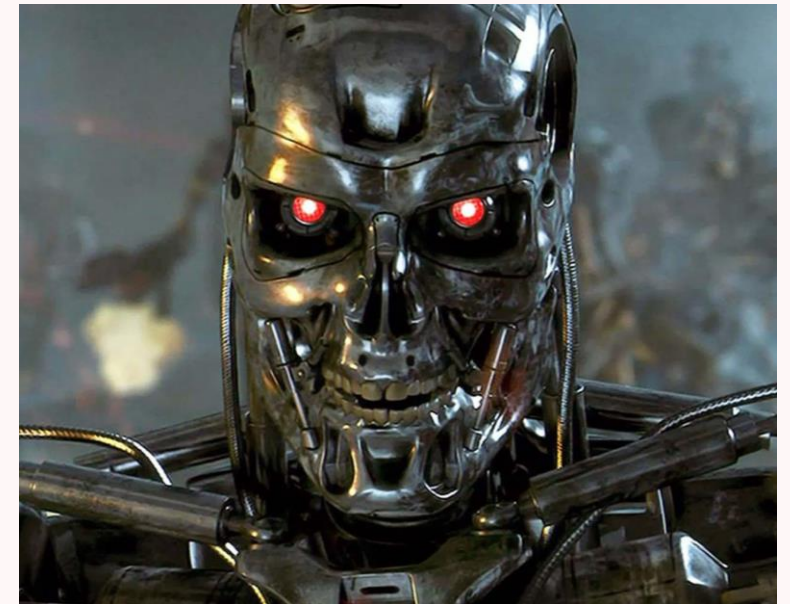
One of my colleagues said something to the tune of “hybrid and online classes are the future”



“No, really!” they said. “students will do all their coursework from their computer and you won’t have to come to campus again”

A long time ago...in a semester far, far away....circa 2018

This is my nightmare -
when you let a
computer run the
show



**Mom, I'm in
an online
class!**



Background

Some folks like online courses

- Accessible to wider audience
- Cheaper to facilitate

I do not (for math-based courses)

Taught 200 level Business Statistics course
since 2010

- Encountered myriad manifestations of math-phobias
- Interaction is very important

Mission: Analyze the role attendance plays with
the availability of....well, everything.....online

"Proponents of multimedia often seem to suggest that the new technology is capable of largely replacing human teachers. This may, in fact, be true when the learner is strongly motivated, mature, and disciplined. It is most unlikely to be true for beginning instruction in statistics for a broad group of college undergraduates."

"Chief among the strengths of human teachers is motivating students"

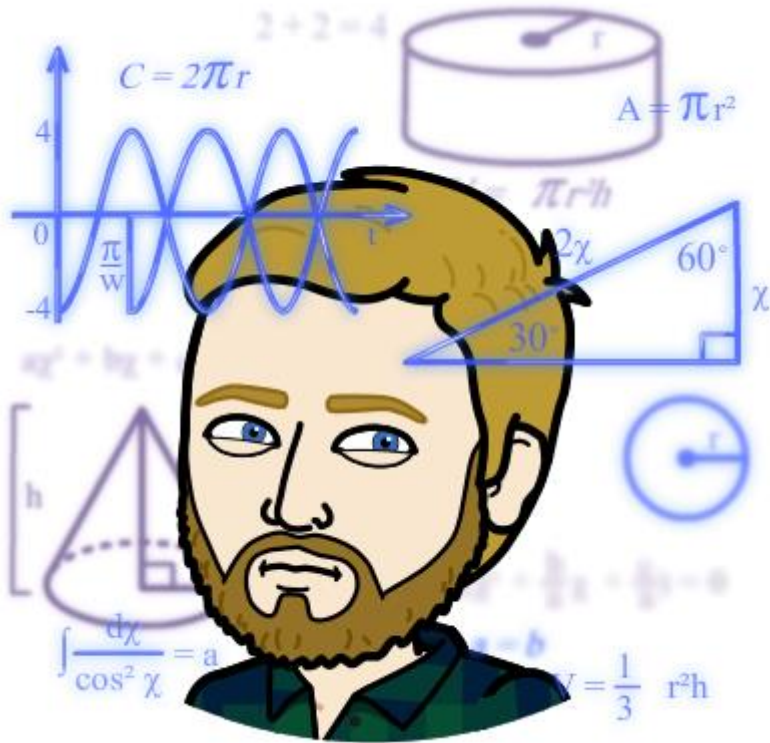
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~Velleman and Moore (1996)

Attendance Still Matters in a World of Digital Learning : Examining Students in Business Statistics

- Q: Is attendance a significant predictor for student performance when technology is used in class?
- Performance measures were the weighted average of exams and homework scores (online)
- Students with one absence: 5.5 points lower on weighted avg exams
- Students with two absences : 6.5 points lower on weighted avg exams
 - AND 13 points lower on the online homework
- Students with three or more absences : 18 points lower on homework (nothing about exams)
- Homework performance has the strongest relationship to the exams (up to 38 points)
- Presented this at the NABET conference in Nov 2019

Covid happens



Covid...was fun! (max sarcasm)

I buy some gear, get super busy building my classes

And It actually worked...

I may have just debunked my own paper before it published

Publish in JFEE (2021)

But I get some more questions out of this, which leads to my sabbatical proposal

Sabbatical Proposal~

Course Delivery Effectiveness: Lessons from the Post-Covid Transition

aka: "Butts in seats make a virtual defeat" (*original working title*)

- Does attendance still matter? Does Modality?
- Before I used what I had access to as prof:
 - Test scores, attendance, homework scores, online time
- With IRB approval (#611), I gather more data
- Include GPA, prereqs, credits, major, work hours, attitudes towards virtual/live class, attitudes towards math
- Six hybrid sections over three semesters
 - Spring 2021 (virtual)
 - Fall 2021 (mix)
 - Spring 2022 (in-person)
 - 113 in-person ; 90 virtual
- Same class, same text, same structure, same prof., same assignments and exams
- Proposed Projects (2 papers, 2 conferences):
 - #1 Big picture Modality/Attendance analysis
 - #2 Item Analysis: modality/absence/success probability estimations

Mom Warned Me Not to Sit Too Close to the Screen: an Analysis on How Virtual Attendance and Absence Affects Performance in Business Statistics



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#1: Logged In or Logged Out? A Statistical Analysis on Absences and Virtual Presence in Business Statistics

- Intervention Analysis (Time-Series)
- Y-variables: **Test Average** and **Homework Average** ($0 \leq X \leq 1$)
- **Abs#**: dummy that indicates how many absences
- **Vatt**: Dummy for virtual attendee
- **Vabs#**: interaction dummy for virtual attendee and # of absences
- **Dummy controls for semester, credit load, Work, Enjoyment**
- **GPA**
- No significant difference in **absence rate** between in-person and virtual attendees
- **Significant positive difference** for in-person exam scores
- Absences had a **significant negative influence** on homework...
- ...which **significantly influences** exam scores
- Virtual attendance negatively impacts exams
- Absent & Virtual enrollment was the worst

Student Description	Count	E(Homework)	E(Test)
In person, no absence	63	93.70%	78.73%
Virtual, no absence	28	81.70%	67.19%
In person, one absence	18	93.70%	78.73%
Virtual, one absence	20	81.70%	67.19%
In-person, two or three absences	6	93.70%	87.43%
Virtual, two or three absences	19	81.70%	66.09%
In-person, four or more absences	26	67.40%	69.23%
Virtual, four or more absences	23	55.40%	51.10%

Hypothetical Student Outcomes

- Fractional Probits : Match attendance to...
 - Homework scores
 - Chapter material exam scores
 - Specific items taught in-class
- Homework Performance
 - No significant difference between virtual and in-person for homework completion
 - Regular attendance (regardless of mode) improved homework performance by 12.6 percentage points
 - Homework was the strongest predictor of test success
- Exam Performance
 - Virtual attendance: -6.7 percentage point reduction in probability of correct answer
 - Virtual attendance effect even stronger for class specific questions: -7.5 percentage points



Instructional Delivery Modalities and Student Learning Outcomes: A Comprehensive Analysis of In-Person and Virtual Learning Environments in Business Statistics Education

Wait! There's More



Scoreboard for Excel

Downloadable (AND FREE) EdTech software that works with Excel

- Office 365 or Excel 2021 versions – Mac or Windows

Make assignments, exams, in-class problems

Customized to your preferences

Provides feedback while they work through their files

Can create an entire class assignment/grade entire class in seconds

Can increase the difficulty and add academic integrity controls

AutoSave

Prep 7 v39_START

Search (Cmd + Ctrl + U)

HomeInsertDrawPage LayoutFormulasDataReviewViewAutomateDeveloper

PasteCutCopyFormat

Arial11

B I U

Wrap Text

General

Conditional FormattingFormat as TableCell Styles

InsertDeleteFormat

AutoSumFillClear

Sort & FilterFind & Select

SensitivityAdd-insAnalyze Data

B27

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
1	earned	possible	cell	error	Joe Bobcat										Press F9 to grade	Feedb
2	0	26														

Strongest Performer

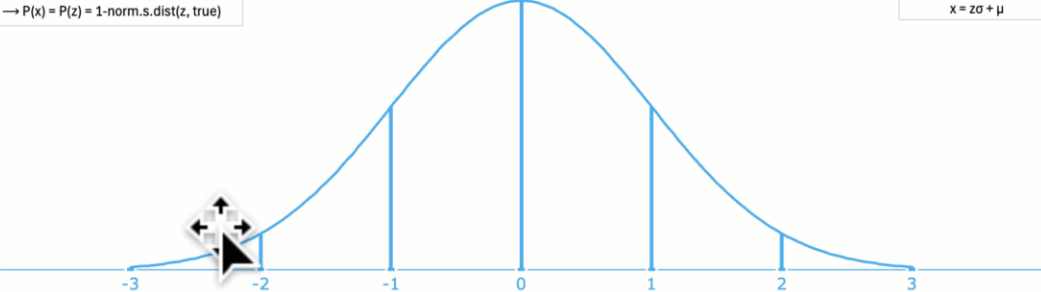
Delaney sells in the Rural division where sales are distributed $N(\$30,000, \$5,000)$. Her sales beat the average for her division by \$7,000.

Nick works in the Urban division where sales are distributed $N(\$35,000, \$10,000)$. His sales are \$40,000.

Who is the best performing employee by percentile?

$x \text{ to } P(x)$
 $z = (x - \mu) / \sigma$
 $\leftarrow P(x) = P(z) = \text{norm.s.dist}(z, \text{true})$
 $\rightarrow P(x) = P(z) = 1 - \text{norm.s.dist}(z, \text{true})$

P(x)



$P(x) \text{ to } x$
 $\leftarrow z = \text{norm.s.inv}(P(x))$
 $\rightarrow z = \text{norm.s.inv}(1 - P(x))$
 $x = z\sigma + \mu$

Population	Individual	case	μ	σ	x	z	$P(x)$	Empirical Rule	Cumm. %	Equations	BAM!
	x (on) or 0 (off):	x	x	x	x	x	x	0	x	x	x
		x	x	x	x	x	x				

Answer all correctly for credit

Top Performer by Total Sales	
Top Performer by Division Percentile	
Top Performer by Sales Above Division Average	

Answer Block

Type answers using the empirical rule

What sales does Nick need to achieve the 84th percentile?	
What sales does Delaney need to achieve the 97.5th percentile?	

Reference cells in formulas to answer

What is the percentile difference between Delaney and Nick?	
At what sales volume does Nick match Delaney's percentile?	
At what sales volume does Delaney match Nick's percentile?	

Scoreboard

Normal DistEmp RuleSales Percentile 1Sales Above 1Strongest 2Top Scores 2Debt 2Tree Height 1

2

Active Learning, Real-Time Feedback, and Academic Integrity in Business Statistics: A Study Using Scoreboard for Excel

- Experiment comparing performance on common assignments between Scoreboard and non-Scoreboard classes
- Students using the tool significantly outperformed control groups across all measured outcomes while also showing increased engagement

Improving Student Performance Without Encouraging Cheating in Business Statistics: Instructional Scaffolding and Academic Integrity with Scoreboard

- Experiment comparing performance between two Scoreboard classes: one with integrity controls
- No benefits to cheating, no benefits to pre-existing stats knowledge (leveling the playing field), significant scaffolding benefits

Integrating Scoreboard for Excel into Introductory Macroeconomics

- Instructional paper on integration with examples for intro macroeconomics

The Final Curtain

#1 Logged In or Logged Out? A Statistical Analysis on Absences and Virtual Presence in Business Statistics

- Presented at the Eastern Economic Association (EEA)
- Forthcoming in the *Journal for Economic Educators*

#2 Instructional Delivery Modalities and Student Learning Outcomes: A Comprehensive Analysis of In-Person and Virtual Learning Environments in Business Statistics Education

- Presented at the National Association of Business, Economics, and Technology (NABET)
- No journal yet, the presentation was last week

#3 Active Learning, Real-Time Feedback, and Academic Integrity in Business Statistics: A Study Using Scoreboard for Excel

- Presented at the Northeast Business and Economics Association (NBEA)
- Published (2025) in the *Journal of Research in Business Education*

#4 Improving Student Performance Without Encouraging Cheating in Business Statistics: Instructional Scaffolding and Academic Integrity with Scoreboard

- Presented at the National Business and Economics Society (NBES)
- Forthcoming in the *Journal of Education for Business*

#5 Integrating Scoreboard for Excel into Introductory Macroeconomics

- Presented at the Journal of Economics Teaching Symposium of Economics Teaching (JETSET)
- Published (2025) in the *Journal of Economics Teaching*