

Statistics in Contemporary Education

John Goulet, PhD

Department of Mathematical Sciences

WPI

MIST 2018

Goal

Have people ponder the current and future roles of statistics in secondary education.

Caution #1: I am not a Powerpoint user.

Caution #2: numerous opinions to be expressed.
Take with usual grain of salt

I. Statistics and General Education

Education has purpose at a number of levels. Perhaps:

Future employment and prosperity

Historical

Cultural

Environmental

Citizen

Citizens

- Confronted with an increasing deluge of data or numerical conclusions (valid or not)
- Also confronted with endless unsubstantiated claims.
- Subjected to sample sizes of 1.
- Has easier access than ever to information.
- Has to make decisions one way or the other.
- Health information
- Health care
- *Jury Duty*

Statistics and General Education

- variation
 - ex: snow removal budgets, stock market
- polls and sampling
- visuals
- comparisons
- trends/regression
- outliers

a little goes a long way

Geometry and Education

Why is Geometry in the curriculum ?

Deductive reasoning.

For some 2500 years.

II. A New Career Path: *Data Mining!*

please appreciate all that Randy Paffenroth touched upon!!!

some of your students need a foundation to go on to that from

III. Calculus & Statistics – *the Odd Couple?*

<https://www.youtube.com/watch?v=00vUIck5cz4>

When to take what and why? And who?

Weaker students take Statistics, stronger students take Calculus.

Run out of Calculus courses, take Statistics.

Downsides

Statistics course has no calculus in it

Calculus course has no statistics in it

How can they ever complement one another?

A story

1996

These kids can't do Statistics . . . (grrr, grumble, ...)

Why not?

They don't know any calculus

But they have all had 2 Calculus courses . . .

Doesn't seem to help

A Goal:

Find ways so that calculus could better complement Stats.

Differential Calculus

Study

$$f(x) = e^{-x^2/2}$$

Symmetry

Max

Asymptotes

Points of Inflection

Linear Regression

A minimization problem

Note: includes summation notation

Integral Calculus

Study

Comments: no antiderivative! No FTC! Riemann sums work fine!
Software helpful.

Later consider

which begs a change of variables. $z = (x - m)/s$

2017:

how'd you make out with Statistics?

oh, good. We learned all the Statistics we needed in your calculus course. 😊

Thank you!!!