

**Dave Hildebrand and Statistics
at Wharton**

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Big Teaching Challenges

How to get a share of student time?

- Curriculum very full
- Can't learn stat without doing it.
- No MBAs come to Wharton to learn stat.
- Style points matter.

How to overcome student ambivalence?

- Student experience in prior stat courses.
 - Statistics = Math, and “I don't do math.”
 - Statistics = Irrelevant Formulas
- Already know statistics.

How to convey abstract ideas without math?

- Poets to engineers
- Existential ideas like standard error

Some Other Challenges

Good for discussion over a beer

Staffing

How to staff a large multi-section course with

- Faculty
- Teaching assistants (Tom was an exception)

and keep them all *coordinated*?

How to develop and staff *subsequent* courses?

School politics

- Only so many courses fit in the first year
- Course evaluations
- Whose syllabus is this anyway?

Technology and productivity

- Recording of lectures for distribution
- Live feeds
- Distance learning ...

Recent Changes

'New curriculum' at Wharton

- Emphasis on 'cross-functional integration'
- Dave sees opportunity to change course.

Content: "Cassettes" short, focussed case studies

- Show how statistics answers questions in business.
- Questions motivate methodology.
- Emphasis on interpretation rather than calculation.
- Handouts → Course pack (Dave) → Casebooks

Delivery: Realtime data analysis

- Dave and Pat were not shy about computers.
- Projection system with screen shots in notes.
- Exploit web for data, notes, assignments...
- JMP-IN for graphical analysis (**DTDP**)

Assessment: Written projects

- Dave's emphasis on written expression.
- Individualized common project.

DTDP

A Mann-Whitney test baffled Frank,
Who learned stat by Formula Crank.
No DTDP;
He just ran up a t;
And would up with the lowest in rank.

A formula grinder named Houle
Thought plotting the data uncool.
His outlying score
Fell right on the floor,
Which botched the Empirical Rule.

One stat student never reflects –
Just grabs for some math from his texts.
He simply forgot
A quick profile plot;
So F's were his tests' main effects.

Beginner at stat Charley Heft
Of good common sense was bereft.
The numbers he'd grind –
No pictures, no mind –
Which skewed all the grades to the left.

Sample Cassette

Quality control and standard error

- Dave added QC as part of the revised curriculum.
- We exploit it to introduce/explain standard error.

How to explain standard error?

(and sampling distributions, CLT, conf intervals...)

- Mathematics of random variables?
- Simulation
“Should I draw lots of samples to estimate μ ?”
- Quality control
Quality control *naturally* has lots of samples.

Cassette on quality control

- Data from manufacture of automobile part
- Individually, then group by day, then week
- Comparing histograms of *observed* means illustrates

$$\text{Var}(\bar{Y}_n) = \frac{\sigma^2}{n}$$

Sample JMP Output

Sample pages of casebook example on QC go here.

Does it work?

Student survey

- MBAs on quinquennial review of Stat Dept
- Well-done survey of 50 classmates
- “Should Statistics be in the MBA core?”
- All 50 agree **yes**.

Course evaluations

- Faculty have won top Wharton teaching prize.
- Course has been among top rated in MBA core.

Going Forward

Continuous improvement

Hard to sustain, and the loss of Dave is significant.

- Dave's use of student input, feedback forms

Where will develop new cases?

Who will be the advocate for the course?

Impact of technology

- Computer at every desk
- Internet video
- Interactive software (JMP 4.0)

What to take away?

- Impact one person can have
- MBAs respond to case oriented approach.
- Dynamic analysis in class enlivens material.