The Big Picture of Data Driven Decision Making

Sacha Litman, McKinsey & Company
Agenda

Going up a Level with our Data

Theory: How our Brain Processes Data and Anecdotes

Application: How to Tell Effective Stories with Data

Examples from Price Elasticity Analysis, Perceived Quality

Q & A

Tomorrow: Exercises Leveraging Data System
Personal Background

Horace Mann, Yale Applied Mathematics, MBA, MPA

Measuring Success Founder

McKinsey Global Head of Analytics for Education and Government

= Big Data for Independent Schools
How Many of you Report Data in One of the Following?

- NBOA
- NAIS/ DASL
- NYSAIS
- INDEX
- Other (SSATB, etc.)
Benchmarks Can Be Misguiding or Manipulated

Your Cholesterol today: 200
Peer Avg (Age & Gender): 150
Your Family Average: 250
Your Cholesterol Last Year: 275
LDL/HDL Ratio: Too Low
Exercise: Daily
Tendency for Schools to Examine One Financial Factor Compared to Peer Benchmarks in Isolation, Without Seeing the Relationships to Other Variables
How Do We Improve Our Schools Through the Use of Data?

- Strategic Visionary
- Seeing contours and patterns in the forest
- In the weeds
Early Career Personal Example in Educational Data

What drives enrollment?

What drives financial sustainability?

What Did I Do Wrong?
Adaptive vs. Technical Challenges
Adaptive Leadership, Heifetz and Linsky
Must Stay in Productive Zone of Disequilibrium
Data Analytics Can Be Highly Disruptive to an Organization

**Stakeholder interests**
- Who benefits from status quo?
- Whose job or role is at stake?
- “WIIFM” – What’s in it for me?
- What is “FUD” – Fear, Uncertainty, Doubt

**Roles in system**
- Role you play wearing “Data” mantle
My initial career example: What did I do wrong?
Why Do People Gravitate to Anecdotes Versus Data?
Data = Culture Change
Why the Cognitive Dissonance?
Daniel Kahneman, *Thinking Fast and Slow*

Emotion (primitive, fast thinking)

Data (recent, slow thinking)
Root It in the Amygdala by Telling a Story
Data Suggests We Have It Backwards: Affordability Is the Effect, Not the Cause!

(Perceived) Quality  (Perceived) Impact  Enrollment & Giving  Financial Sustainability  Affordability
Data Is Unsatisfying When It Does Not Support Anecdotes

Private Schools’ Change in Tuition vs. Change in Enrollment in subsequent year

This school raised tuition 10% and enrollment grew due to high perceived value.

This school kept tuition flat and enrollment fell anyway because poor perceived value.
Good Movies All Use Storytelling

1. Academic: Statistical Models, Bill James
2. Innovation: Oakland A’s, Billy Beane
3. Mainstream: every baseball team uses statistics for player drafting, development, contracts
Latest Analysis on Price Effects on Enrollment: Expanded Definition of “Enrollment”

- Enrollment by Division
- Attrition from Prior Division to Entry Grade
- Applications to Entry Point Grade
- Yield
- Students on Financial Aid
Outcome: **Enrollment Change (% and #) by Division and Whole School**

Result: **No relationship**

**Relationship Between Change in Enrollment and Change in Tuition (for Whole School)**
Outcome: **Retention Change from Prior Division**

Result: **No relationship**
**Outcome:** Change in # Applications

**Result:** No relationship
Outcome: **Change in % Yield**
Result: **No relationship**

**Relationship Between Change in Tuition for MS/US and Difference in MS/US Yield**

**Outcome:** Change in % Yield
**Result:** No relationship
46 Regressions We Conducted, and 98 Percent Showed No Relationship Between Tuition Changes and Measures of Enrollment

<table>
<thead>
<tr>
<th>Size of School</th>
<th>Divisions Operated</th>
<th>Price Point</th>
<th>Entry Point Grades – All Points of Admission Funnel</th>
<th>Pairs of Years, Time-Series Across all Years</th>
<th>Change in Outcome Variable and Predictor Examined as % and #</th>
<th>Controlling for All Factors Noted Earlier</th>
</tr>
</thead>
</table>


**Relationships We DID Find Affecting Enrollment**

- Schools with Mid-Range Tuition ($15k-25k)
- Small Schools (<300 Enrollment)
- Birth Rates
- Financial Aid
...However the Cost-Benefit Analysis (Loss of Added Tuition $ vs. Increase in Students) Does Not Pay Off
For Small Schools (<300) Found 10 Percentage Point Increase in Students on Financial Aid Associated with 1 Percent Higher Enrollment

Scenario

- 200 Student School
- $15k Tuition
- $5k Average Financial Aid Award

30% Kids on Financial Aid

40% Kids on Financial Aid

+ 2 More Students = $30k Gross Tuition

-- 20 More Kids on Aid = $100k More Awarded in FA
% Students on Financial Aid as a Driver of Enrollment Change (In Addition to Other Factors) Is a Very Mixed Bag and Effects on Enrollment Are Miniscule Across the Board

3 Measures Used
• Year-Over-Year Change in % Kids on FA Within School
• Starting % Kids on FA
• Average Financial Aid Award

<table>
<thead>
<tr>
<th>Financial Aid Positive Effect</th>
<th>Financial Aid Negative Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/14 to 14/15 year</td>
<td>2010-2013 Jump</td>
</tr>
<tr>
<td>Small Schools &lt;300</td>
<td>K12s with a Pre-school</td>
</tr>
<tr>
<td>K12s Without a Pre-school</td>
<td>Schools with Mid-range Tuition ($15k-$25k)</td>
</tr>
</tbody>
</table>
Surprised?
So What?

In 98% of Analyses, No Relationship Between Tuition Change and Enrollment

In Those Cases Where Was a Relationship, Cost-Benefit Analysis Does Not Make Sense to Hold Price as Net Revenues Fall

Focus on Distinctive Quality and Mission Attainment

Set Tuition According to Perceived Quality
Virtuous Cycle: Look at Individual Variables Together
Best Proxy for Perceived Quality Is “Likelihood to Recommend to a Friend” (A.K.A. Promoter Score)
Striving for Top Performer
Benchmarking: a Rising Tide That Lifts All Boats but Focus on Top Performers Not Averages

- Across Groups
- Peer Organizations Nation-Wide
- Local Competition
- Across Demographic Groups
- Against Own Longitudinal History
Data to Identify Drivers of Desired Outcomes in Schools
... like Perceived Quality
What Are Top Factors Driving Perceived Quality for Parents? Analysis of 50,000 Surveys

Drivers of Parents’ Perceived Quality

- #1: Child Character Development
- #2: Preparedness for Next Academic Environment
- #3: Responsiveness/Communication
What Are Top Factors Driving Perceived Quality for Alumni? Analysis of 20,000 Surveys

Drivers of Parents’ Perceived Quality

#1: Character Development
#2: Friendships
#3: Academic Preparation
As Perception of Drivers Increase, so Too Likelihood to Recommend – and Most Importantly, Retention Rate!

Change in Drivers

- Graduate Academic Preparedness: +16% pts.
- Responsiveness to Parent Concerns: +19% pts.

Recommend School to a Friend
% Strongly Agree

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Year 2</th>
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<tbody>
<tr>
<td>1.5JC</td>
<td>72%</td>
</tr>
<tr>
<td>2.X</td>
<td>71%</td>
</tr>
<tr>
<td>3.X</td>
<td>69%</td>
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<tr>
<td>43%</td>
<td>52%</td>
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</table>

Retention Rate

+8% pts
Data Is Not a Point-In-Time Effort but About Driving Continuous Improvement

1. Measure
2. Strategize
3. Implement
Data Driven Decision Making Is Parallel to What We Teach in Middle School Science Class

- Identify Issue
- State Hypothesis: “I Believe...”
- Perceived Mechanism/Cause
- Design Experiment
- Examine Data
- Confirm or Reject Hypothesis
How Can Your School Go Beyond Benchmarks?

“I think you should be more explicit here in step two.”
SHOW ME THE MONEY!
### Activities Potentially Associated with Giving Increases

<table>
<thead>
<tr>
<th>Factor</th>
<th>Correlation: +, --, or None</th>
<th>Anecdotal Justification</th>
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<tr>
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<td>Solicitation by Volunteer vs. Professional</td>
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<tr>
<td>Frequency of Cultivation Meetings</td>
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<tr>
<td>Spousal Involvement in Your Org</td>
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Let’s Test Your Intuition....

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<tr>
<th>Area</th>
<th>Correlation: +, --, or none</th>
<th>Additional Data on Major Donors</th>
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80% of Board Anecdotes (across 1200 clients) are Not Supported by the Data...

... So diffuse the power of anecdotes by turning them into hypotheses you can test
Did Your Mind Seize on New Anecdotes to Fit the Data Findings?

... Discussing the 80% of hypotheses that were not substantiated can be more impactful than showing the 20% that were
Moneyball, Anecdotes, and Data Driven Decisions
Moneyball, Anecdotes, and Data Driven Decisions
7 Stages of Data-Driven Decision Making: Schools Tend to Collect and Analyze Only

1. Framing the Problem
2. Hypothesis from Anecdotes
3. Data Collection
4. Data Analysis
5. Interpretation
6. Decision Making
7. Storytelling
Data-Driven Decision Making is About Alignment

Board/Management Team’s Choice: Improve the Results (Data) or Change the Hypothesis
Ideal Roles

Board
Head of School
Business Office

Hypotheses
Scenario Planning
Data
How Could Platforms Improve to Support More Than Benchmarking?

**Year 2?**
- Introduce More Analytics and BI Power
- In-Depth Training to Use the Data to Drive Decisions in Your School and Tell Effective Stories

**Year 3?**
- Identify Factors Most Associated with Goals of Enrollment, Financial Sustainability, Fundraising

**Year 4?**
- Tie Financials with Impact and Perceived Quality
- Hypothesis Testing
Key Takeaways?
### Use Strategic Financial Modeling Tools

**Flight Simulators for Testing Hypotheses**

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**Control Panel**

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**Instructions**: Use this page to navigate throughout the model. By clicking on the buttons below, you can skip to your desired page.

<table>
<thead>
<tr>
<th>Introduction</th>
<th>Using the Model</th>
<th>Introductions</th>
<th>Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entering Data into the model</td>
<td><strong>Cost Allocation</strong> (input starts here)</td>
<td>Faculty Usage</td>
<td>Assumptions</td>
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<tr>
<td>Lower School</td>
<td>Feeder Schools</td>
<td>Enrollment</td>
<td>Expense Projections</td>
</tr>
<tr>
<td>Middle School</td>
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<td>High School</td>
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<td>Whole School</td>
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<td>High School</td>
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<tr>
<td>Summary</td>
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<td>High School</td>
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</table>

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**Help Desk**: fmsupport@measuring-success.com
Scenario Planning

Base Case

Simulate: Compare to Base Case

Hypothesis

New Hypothesis

Simulate: is It Sustainable?

Scenario Planning
Tendency for Schools to Examine One Financial Factor Compared to Peer Benchmarks in Isolation, Without Seeing the Relationships to Other Variables
Danger in Solitary Data Approach

Vicious Cycle

- Fewer Full Tuition Payers
- Fewer Students
- Prices kept lower than cost
- Less Financial Aid Available
- Unrealistic Fundraising Burden (Lower Coverage Ratio)
- Cut Expenditures
- Lower Value
Questions to Answer

1. What is the Problem and Stakes?
2. What’s the Anecdotal/Emotional Solution?
3. Why is Emotional Response Potentially Problematic?
4. What is Your Hypothesized Financially Sustainable Solution?
5. What Data Do You Need to Collect to Prove It?
6. How Would You Tell the Story (Assuming Hypothesis Validated by Data)?
Cautionary Tales of Major Funder Support for Independent Schools

Funder Makes Largest Gift in School History

Used to Reduce Tuition, Increase Financial Aid

Funder Dependency Grows

Enrollment Does Not Improve, Quality Questioned

Decreased Financial Sustainability

Funder’s Gift Ends
Scenario 1: Top of the Heap

- Enrollment at Capacity, but Building Out More Space
- Financial Benchmarks in Line with Peers
- Perceived Value is Strong

*Alternative: spend more from your endowment to achieve same objective

$5 Million Gift to Reduce Tuition and Make School More Affordable for All*

Biggest Donor Offers An Even Bigger Gift...
Scenario 2: Tightrope Balancing Act

Enrollment Has Been Flat

Perceived Value is OK

Tuition on Par with Peers

Turning Down Only Those Kids Developmentally Cannot Handle

But Financial Aid % Has Been Growing Rapidly to Retain and Attract Families

Perceived Value is OK

Tuition on Par with Peers

But Financial Aid % Has Been Growing Rapidly to Retain and Attract Families

Turning Down Only Those Kids Developmentally Cannot Handle
Scenario 3: Turnaround

Struggling to Stem Enrollment Drops

Perceived Value is Weak

Insufficient Full Paying Families and Tuition Being Held Down Artificially

Annual Deficit of $1M+ Eating into Your Reserves

Classrooms only 2/3 full so expense per student higher than tuition
What Are the “Big Problems” That “Big Data” Can Enable Us to Solve? (See Article)

- Effective Scenario Planning to Ensure Financial Sustainability
- Lead Generation: Identifying Top Prospects in Our Marketplace and Proactively Recruiting
- Cultivating Alumni Most Likely to Become Major Donors
- Student Personalized Learning
- Price Elasticity of Demand
Price Elasticity of Demand

Van Westendorp Analysis

• Used by pricing experts to determine optimal price for service or product from its known customers

• Asked five questions on survey
  • **At what price would I consider membership dues:**
    A. Too expensive to consider
    B. Getting expensive, and would have to reevaluate membership
    C. Bargain for the experience the synagogue provides
    D. So inexpensive the quality of the programs must be compromised and therefore I would not consider participating
    E. If membership was set between what you identified in “b. getting expensive” and “c. a bargain”, how likely would you be to pay membership dues?
Van Westendorp Analysis from Sample School: Can Increase Net Tuition $2750 Beyond Where It Is Today

Too expensive to consider
Getting expensive, would have to reevaluate
Tuition a bargain for the education
Too inexpensive, quality of education compromised
In Terms of “Big Data” What Should Schools Be Able to Leverage Together?

Admissions -> Student -> Alumni Tracking (CRM)

Perceived Quality Data (Surveys)

Financial, Operational, Salary Data
How Should Perceived Quality Be Captured? (And How Often...See Article)
Putting It All Together

Best Practice Financial Ratios

Financial Sustainability: Financial Simulations

Perceived Quality: Surveys