# Assessing Admissions Data for Non-Cognitive Indicators of Success

**David Godow**
*Consultant*

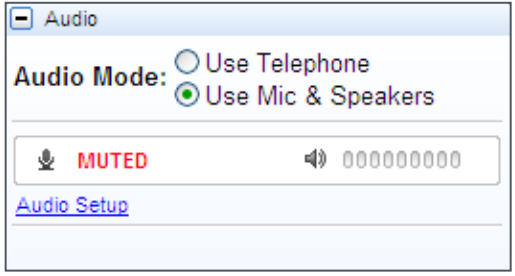
dgodow@eab.com
202-568-7172

Enrollment
Management Forum

# Managing Your Audio




If you select the "use telephone" option, please dial in with the phone number and access code provided

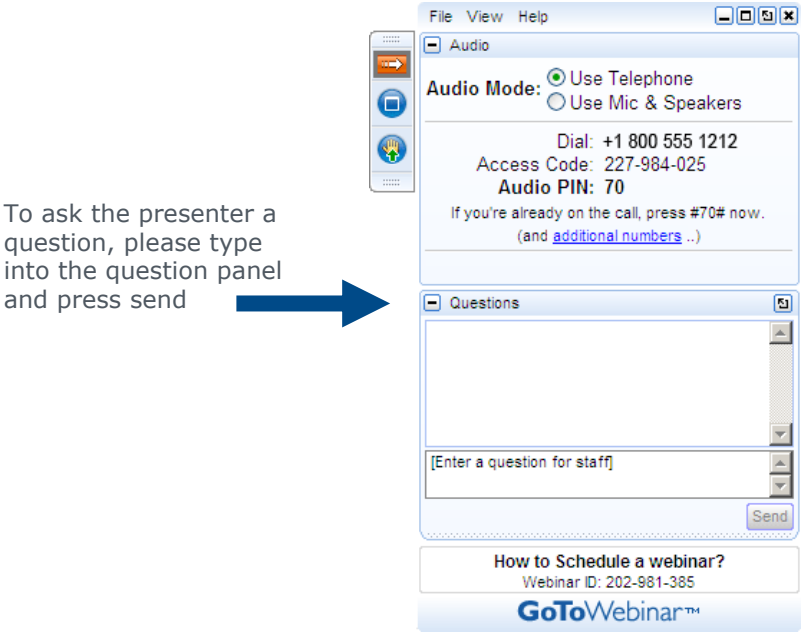



If you select the "mic & speakers" option, please be sure that your speakers/headphones are connected

# Managing Your Questions



To ask the presenter a question, please type into the question panel and press send

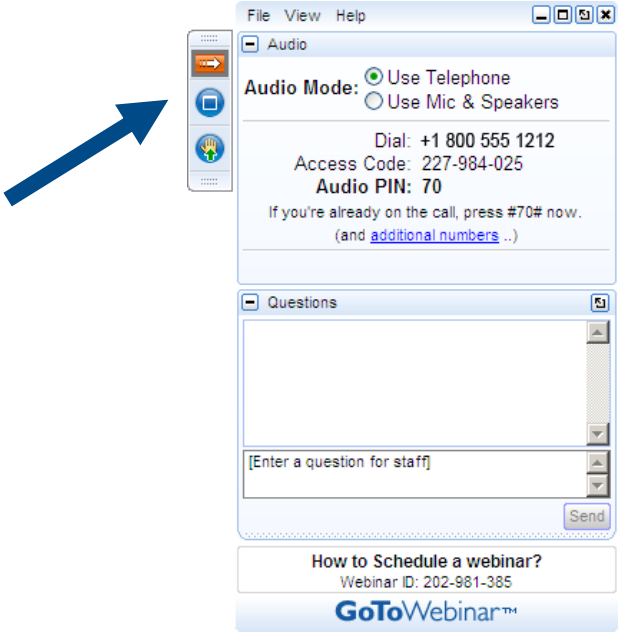


# Managing Your Screen



Use the **orange and white arrow** to minimize and maximize the GoTo panel

Use the **blue and white square** to maximize the presentation area



1 The Promise of Smart Selection

2 The Low-Hanging Fruit in Non-Cognitive Admissions
- Practice #1: Application Behavior Retention Modeling
- Practice #2: Focused Holistic Analysis

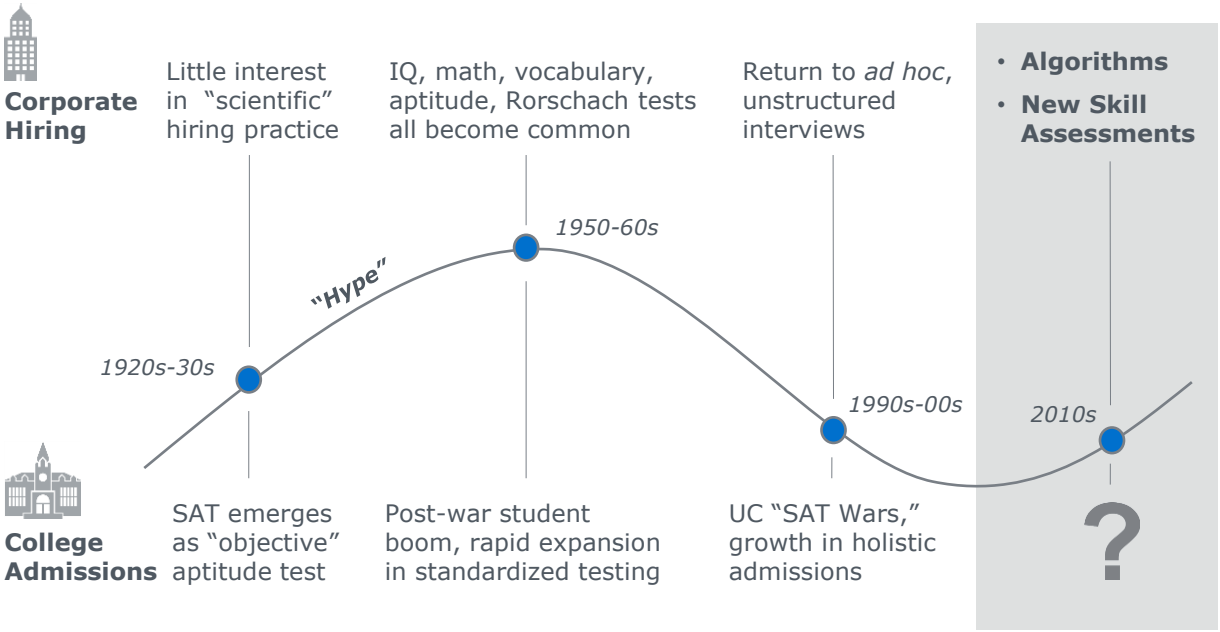
3 Better Utilizing Cognitive Measures
- Practice #3: Predicted Retention Index
- Practice #4: STEM-Specific Major Counseling

# Higher Ed Behind the Curve



## Corporate HR, Admissions Progress with Analytics Together… Until Now?

### The Gartner Hype Cycle for Selection Analytics




Source: Don Peck, "They're Watching You at Work," *The Atlantic,* December 2013; Richard C. Atkinson & Saul Geiser, "Reflections on a Century of College Admissions Tests," in *SAT Wars: The Case for Test-Optional College Admissions* (Joseph A. Soares, ed.), 2009.

# Not Just Hot Air



## Algorithmic Hiring at Entry Level Shows Real Results

xerox evolv

**Improving Front-line Customer Service**

- Customer service reps evaluated by algorithm; no interview
- Draws on personality tests, biographical info, and cognitive data

More accurately predicts performance than interviews

Manager gets easy red/yellow/green hiring recommendation

sears

**Streamlining Seasonal Retail Hires**

- Online application melds roleplaying with behavioral questions
- Sifts through 6M applications while ***improving*** service

Simulation tool tests behavior in realistic sales scenario

Behavioral questions emphasize customer orientation, digital savvy

**20%** **Reduction in employee attrition**

**30%** **Reduction in candidates interviewed (cost-to-hire)**

Source: Glenn Rifkin, "Big Data, Predictive Analytics and Hiring," Korn Ferry Briefings on Talent and Leadership, Summer 2014; Don Peck, "They're Watching You at Work," *The Atlantic*, December 2013.

# Moving Forward From the SAT Wars



## Three Ways to Advance Our Predictiveness of Student Success

### Significant Work Left to Do in Predicting Success

**HS GPA and test scores together** remain best predictors among traditional indicators

Continued scholarly conflict over **predictive value of SAT**[1]


**... *but* current models predict, at best, 20-40%** of 1st-year performance

### How Can We Do Better?

**Better Use of Traditional Measures**

- Dynamic models
- Disciplinary specialization

**Creative Use of Application Data**

- Application behavior
- Non-cognitive info from existing applications

**New (or Old?) Non-cognitive Measures**

- Sedlacek method
- Biographical data (biodata)
- Automated questionnaires

1) See, e.g., Zwick, 2013; Zwick & Himelfarb, 2011; Agronow & Studley, 2007; Kobrin et al., 2008.

1. The Promise of Smart Selection

2. The Low-Hanging Fruit in Non-Cognitive Admissions
   - Practice #1: Application Behavior Retention Modeling
   - Practice #2: Focused Holistic Analysis

3. Better Utilizing Cognitive Measures
   - Practice #3: Predicted Retention Index
   - Practice #4: STEM-Specific Major Counseling

# Non-Cognitive Data… Right Under Our Noses?



## Applicant Behavior Signals Non-Cognitive Factors like Engagement, Grit

### Application Behavior a Robust (and Low Cost) Source of Non-Cognitive Data

***Application Behavior***

Time of application, campus visit, time of first contact with inst.

***Significant in Yield Models, But Underleveraged for Retention***

**Multiple Choice Surveys**

MAP-Works, NSSE, Noel-Levitz CSI

*Students Unlikely to Respond Truthfully in Admissions Context*

**Biodata Assessment**

Factual inventory of student experiences (e.g., books read in last 6 months)

*Usefulness in Practice Not Yet Demonstrated*

**Psychometric Essay Prompts**

Autobiographical description of student experiences and attitudes

*Practical Results Often Ambiguous*



Source: EAB interviews and analysis.

# Extending a Well-Known Insight



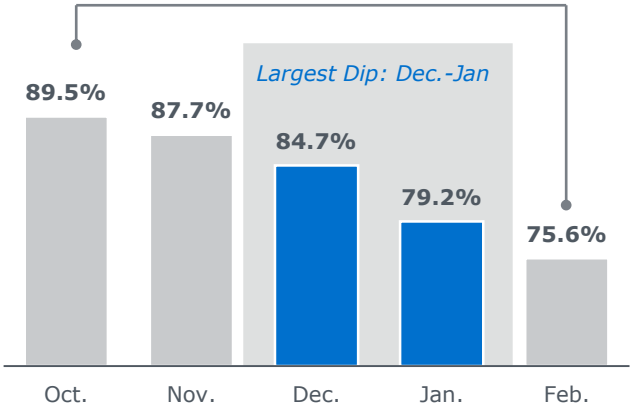
## Application Timing Relevant for Retention as Well as Yield

WASHINGTON STATE UNIVERSITY

### Later Applicants Retain at Lower Rates

*1st-Year Retention by Month of Application, Washington State University, 2004-2008 Entering Cohorts*

**15%** Drop in retention between October and February applicants




### Lingering Questions

1. *Does this trend **exist at institutions with different selectivity?***

**Answer: Yes** UMASS AMHERST

2. *Does application timing appear to have **independent predictive power?***

**Answer: Yes**

Source: James Roche, "The Application Submission Date as an Indicator of Performance and Persistence," *SEM Quarterly* 2:1 (April 2014); EAB interviews and analysis

# An Additional Predictor for At-Risk Students

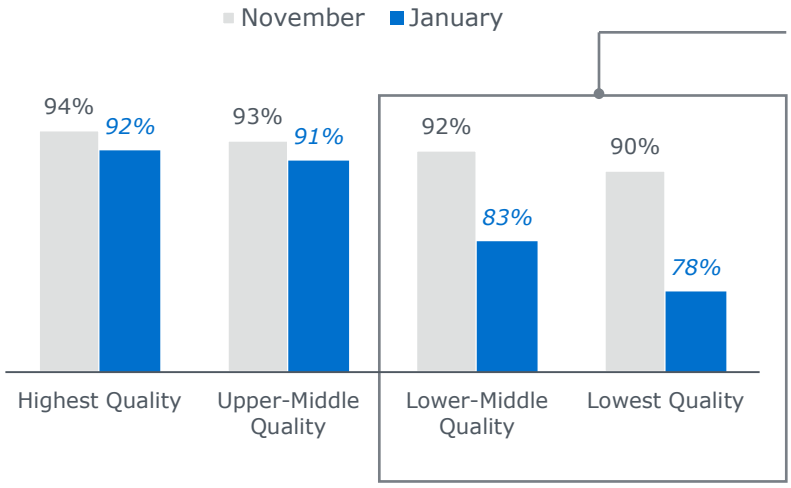


## Timing an Independent Predictor, Highly Significant for Riskiest Students

### Less-Prepared Students at Greater Attrition Risk When Applying Late

*1st-Year Retention by Month of Application and Academic Quality (GPA/SAT), UMass-Amherst, 2009-2011 Entering Cohorts*

UMASS AMHERST




**What Are We Really Capturing Here?**

- Grit/Non-Cognitive Strengths
- Engagement with Institution
- Demographic Variables

*…. Or **all three?***

Source: James Roche, "The Application Submission Date as an Indicator of Performance and Persistence," *SEM Quarterly* 2:1 (April 2014); EAB interviews and analysis.

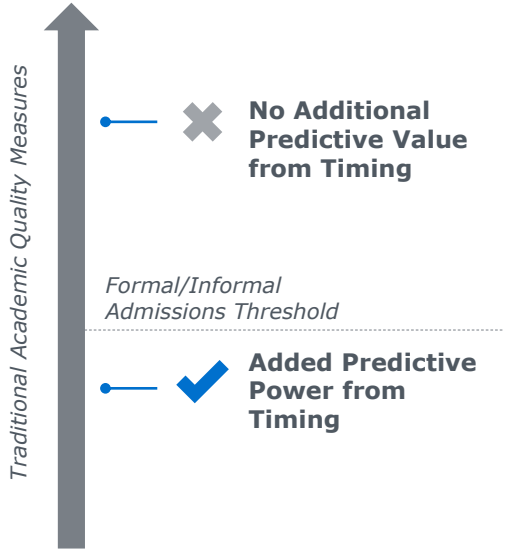
# Making At-Risk Admits Less Risky



## Using Timing in Index Improves Bets on Less-Prepared Students

### Integrating Application Behavior into Tertiary Admissions

*Predicted Retention by Academic Quality Variables (Illustrative)*




**Enrolling Less-Prepared Students and *Improving* Retention**

- **Background:** New president increases enrollment goals in April of recruitment year
- **Tactic:** Include ***application date*** and ***HS quality*** into predicted retention model
  - Results guide ***600 last-minute admissions***
- **Results:** ~180 new enrollments from marginal group
  - ***3% increase in retention*** above students with similar qualifications

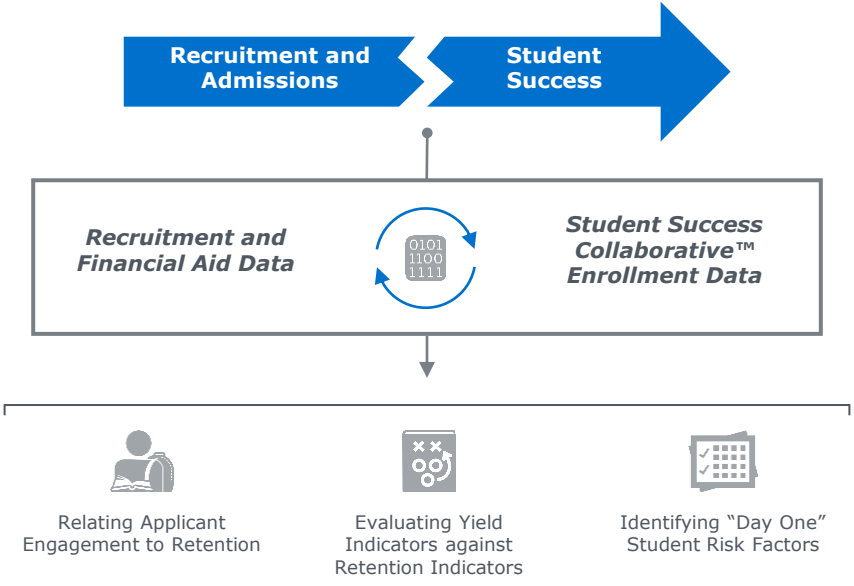


Source: EAB interviews and analysis.

# Aligning Recruitment with Retention



## Exploratory Research Project to Identify Pre-Enrollment Success Markers



# Lack of App. Engagement a Huge Retention Risk

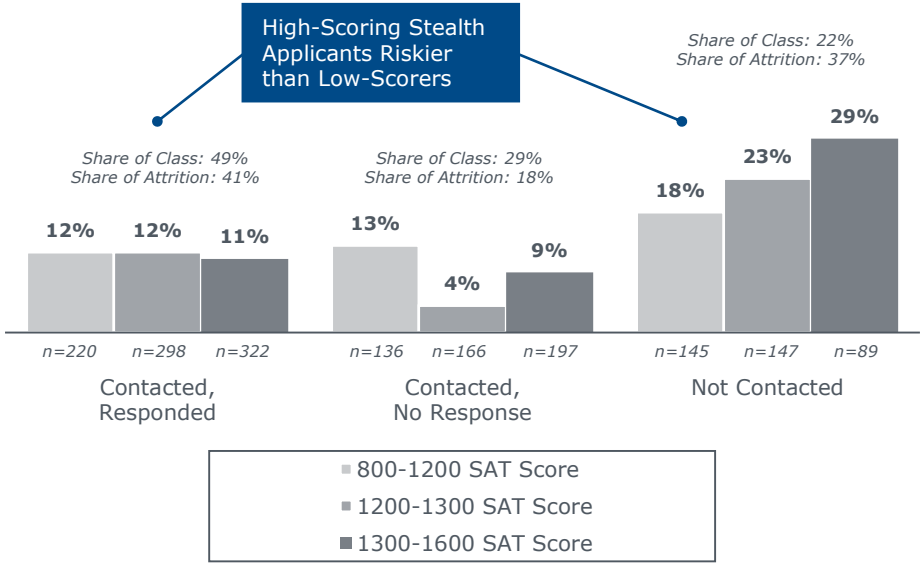


## Non-Cultivated Students, Especially High-Scorers, Attrit At Higher Rates

**Total Two-Year Attrition by Recruitment Contact and SAT**

*Entering Class of 2012, Private Research University in the Northeast*

N=1,720 Students




1) SAT scores normalized to a 1600-point scale



Source: EAB interviews and analysis



# Lacking Non-Cognitive Insight, Not Information

## Inconsistent Analysis of Existing Non-Cognitive Data Reduces Predictiveness

**Are Our Qualitative, Holistic Indicators As Useful As They Could Be?**

**Cognitive Data**

- HS GPA
- Standardized tests
- Class rank

**Demographic Data**

- Family income
- Parents' education
- HS funding levels

**Extracurriculars**

- Leadership
- Service
- Sports

**Character Indicators**

- Personal essays
- Recommendations

- Statistically verifiable, if not perfect, predictors of success
- Quantitative; conclusions consistent across readers
- Relatively more acceptance of key metrics across the discipline

- Necessary for holistic review, but predictiveness uncertain
- Inherently subjective; conclusions differ between readers
- No standards for what's important (e.g., # or intensity of extracurriculars?)

# Finding Risk in Sea of Sterling Credentials



## Uniformly High HS GPA and Test Scores Make New Predictors Crucial

### How to Find "Needle in a Haystack" Leavers?

*Illustrative Selective University*

**90%** First-year retention

**75%** Six-year graduation rate

### First Year Progression is Key…

**95%** Students with 2.5 GPA & 27 credits in 1st year

**40%** Students not meeting GPA and credit benchmarks

### … But Traditional Factors Fail to Predict It

**Little Variation in Cognitive Variables**

***Avg. HS GPA:*** *3.82*

***Avg. SAT:*** *1,900*

***Demographics:*** *Similar*

> "At my previous institution, we found that all incoming high school GPAs were very high, but half of them fell to the bottom of the distribution in the first year… **In our pool, traditional variables have limited variance**."
>
> *Chief Enrollment Officer*
>
> *Public Research University, Midwest*



Source: EAB interviews and analysis.



# Emphasizing Intensity Over Box-Checking

## More Rigorous, Consistent Standards Extract More Focused Insight

**New Standards Focused on Quality over Quantity of Experiences, Clear Expectations**

*Public Research University, Midwest*

| Data Source | Typical Criteria | Strategic Criteria |
|---|---|---|
| ***Extracurriculars*** | # of activities completed | At least 10 hours weekly for a 10-week "season" to show commitment |
| ***Leadership*** | # of positions listed or attained | Activity must require significant commitment (10 for 10 standard) |
| ***Recommendation Letters*** | Informal, varying reading standards | Search for traits: class participation, respect, conscientousness |
| ***Career Goals*** | Inferred by reader or ignored | 4-point scale with bonus for related activity |
| ***Perceived Chance of Success*** | Implied in admission offer | Reader rates potential on 4-point scale |



Source: EAB interviews and analysis.

# An Incremental Step Forward



## Non-Cognitive Indicators Help Predictiveness, Still More to Do

### Running the Numbers

- 300 applications from 2012 cycle re-read using new non-cognitive criteria
- Predictive success model re-run using new assessments

**Promising Early Results**

- Ability to predict which students will succeed increases from 79% to 86%
- Ability to predict failures still moderate
- Improved reader satisfaction with evaluation process
- Reader's qualitative expectation of success most significant

### Breaking Down the Model

**Statistically Significant New Non-Cognitive Indicators**

- Qualifying leadership position
- Recognized as leader by recommender
- Reader-perceived chances for success

**Important Cognitive Indicators**

- Number of B grades on transcript
- Number of B- grades or worse on transcript
- Share of applicants from an applicant's HS considered competitive for admission (HS quality indicator)



Source: EAB interviews and analysis.

1. The Promise of Smart Selection

2. The Low-Hanging Fruit in Non-Cognitive Admissions
   - Practice #1: Application Behavior Retention Modeling
   - Practice #2: Focused Holistic Analysis

3. Better Utilizing Cognitive Measures
   - Practice #3: Predicted Retention Index
   - Practice #4: STEM-Specific Major Counseling

# Capture the Low-Hanging Fruit in Screening



## Some Institutions Not Fully Exploiting Traditional Academic Quality Variables

### Dynamic Index Superior for Identifying Promising Students

**Static Minimum Threshold**

- Combination of HS GPA and test score thresholds
- Example: students must have a minimum of a 20 ACT and a 2.5 GPA to be admitted

- Potentially not predictive of student success at all
- Rejects gritty students with low test scores but high GPAs

**Predicted Success Index**

- Based on analysis of institution's historical data
- Allows applicant HS GPA and test scores to vary while holding predicted success constant

- Permits smart bets on students with low test scores, high GPAs
- Can include finer-grained success indicators (e.g., STEM GPA)



Source: EAB interviews and analysis.

# Capturing the Predictive Power of HS GPA



## Predicted Success Index Increasingly Common, But Quick Win for Some

### Point Index Holds Retention Constant While Overweighting GPA

*Sample Admissions Index (Partial) Based on Predicted Success, Texas Woman's University*

| GPA Scale (60% Weight) | Points | SAT /ACT (40% Weight) | Points |
|---|---|---|---|
| 3 | 550 | 1170-1190 or 26 | 450 |
| 2.9 | 540 | 1130-1160 or 25 | 420 |
| 2.8 | 530 | 1090-1120 or 24 | 390 |
| 2.7 | 520 | 1050-1080 or 23 | 360 |
| 2.6 | 510 | 1010-1040 or 22 | 330 |
| 2.5 | 500 | 970-1000 or 21 | 300 |

### Growing Without Reducing Quality

*Results from 2011 Index Implementation, Texas Woman's University*

**20%** Increase in size of freshman class, 2010-2012

**6.1%** Point increase in 1st-yr retention, 2010-2012

"10 years ago, you would have needed a PhD to do this [type of modeling]… The tools are much better now, ***but a surprising number of admissions deans still aren't thinking about it***."

*Vice President for Enrollment, Private Very High Research Univ. (Midwest)*



Source: EAB interviews and analysis.

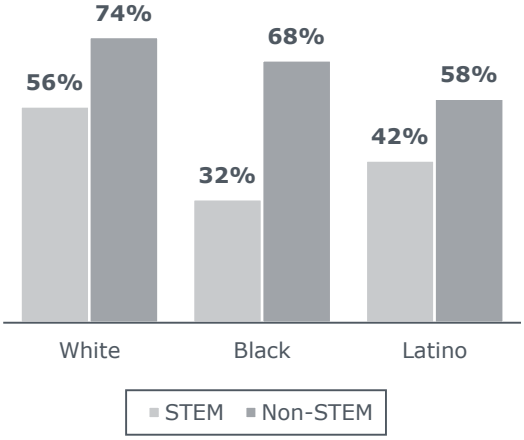
# Tests, HS GPA Insufficient to Predict STEM Success



## STEM Students Appear Strong by Traditional Standards, But Likely to Attrit

### STEM Students Less Likely to Complete Across Race/Ethnicity…

*5-yr Completion Rates[1] for 2004 Entering Cohort, STEM vs. non-STEM Fields*




### … Despite (Seemingly) Superior Academic Quality

**0.24** **Average advantage in HS GPA** of quant. STEM[2] students over non-STEM

**2.9** **Average advantage in ACT Composite** of quant. STEM students over non-STEM

1) Completion data drawn from National Student Clearinghouse data covering 201,588 students at 326 four-year, non-profit institutions.

2) Describes students in "quantitative" STEM disciplines (e.g., mathematics, engineering), but not "non-quantitative" STEM (e.g., biology).

Source: Higher Education Research Institute, "Degrees of Success: Bachelor's Degree Completion Rates among Initial STEM Majors," January 2010; EAB interviews and analysis.

# The Importance of STEM-specific Variables



## Math/Science Prep, Often Neglected in Admissions, May Be Best Predictors

### The Variables Behind STEM Student Success

*Still Necessary, But Not Sufficient*

- HS GPA
- ACT/SAT
- Class Rank
- HS Quality Indicator

***Key Sources of New Insight***

- **Math HS GPA**
- **Highest Level of Math Taken**
- **Confidence in Math Skills**
- **Math SAT/ACT/AP**
- **Other Placement Tests**

**23%** Share of variation in engineering FY GPA explained by quantitative skills (*Veenstra, Dey, and Herrin, 2008)*

**STEM-Specific Variables More Significant Than Standard Indicators?**

"In modeling [1st-yr GPA for engineers], excellent **high school preparation in math and science and confidence in math and computer abilities … [are] more important** than overall high school academic achievement."

*Veenstra, Dey, and Herrin (2008)*

Source: Veemstra, Dey, and Herrin, "Is Modeling of Freshman Engineering Success Different from Modeling of Non-Engineering Students?" *The Research Journal for Engineering Education* (October 2008).

# Steering Students to Better-Fit Majors



## Admissions Use Historical Success Data to Guide Students' Major Choice

### Predictive Index

- Logistic regression analysis of historical success in high-attrition STEM disciplines
- Includes traditional and STEM-specific variables
- Index for use in admissions created based on regression

### Counselor Triage

*Small Private Univ.*

- Counselors contact students with low index scores after admission
- Counselor emphasizes student's "merit," pitches less quantitative majors (e.g., biology)

### Admission Decision Input

*Large Public Univ.*

- Index suggests whether students admitted into STEM major or as undeclared
- Undeclared students work with advising to find better fit

### Early Progress Monitoring

- Advisors track student progress in gateway courses
- Weak performance leads advisors to counsel students to other majors



Source: EAB interviews and analysis.

# A Double Student Success Dividend



## Index Improves Retention While Counseling Sees Additional Yield Benefit

(*Public Master's University, West*)

**Admissions Index Rebalanced to be More Predictive of Success**

**2%** Point increase in 1st-yr retention in science/engineering with combined indices and gateway course performance tracking

(*Private Master's University, Midwest*)

**Unexpected Yield Bump From Counselor Touch**

**4%** Point increase in yield for counseled students over undergraduate average

**A More Welcome Message Than We Thought**

"Our counselors try to make the risks [of majoring in STEM without proper preparation] clear to students. Students actually like this. Most 18 year-olds don't really know what they want to do and appreciate that someone cares about their success."

*Chief Enrollment Officer*

*Private Master's University (Midwest)*

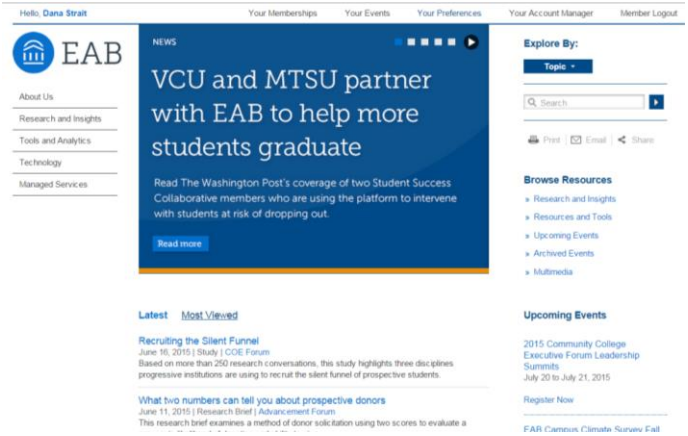


Source: EAB interviews and analysis

# Thank You for Your Time

## Please Contact Us with Questions

### Access More Resources at http://www.EAB.com




**David Godow**
*Consultant*

dgodow@eab.com
202-568-7172