

Expanding Education's Predictors and Criteria: The Research and Assessment of 21st Century and Noncognitive Skills

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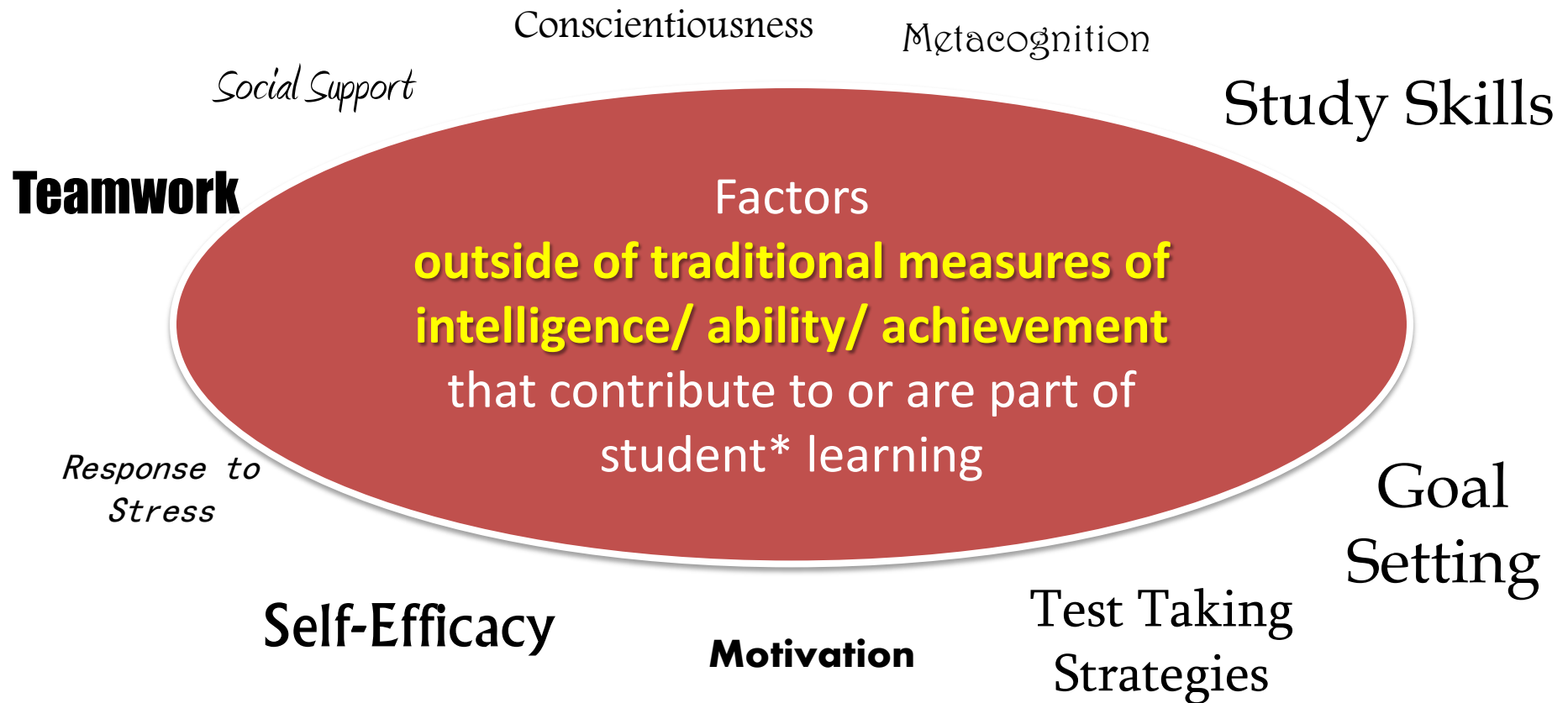
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*Listening. Learning. Leading.**

A BIT OF CONTEXT

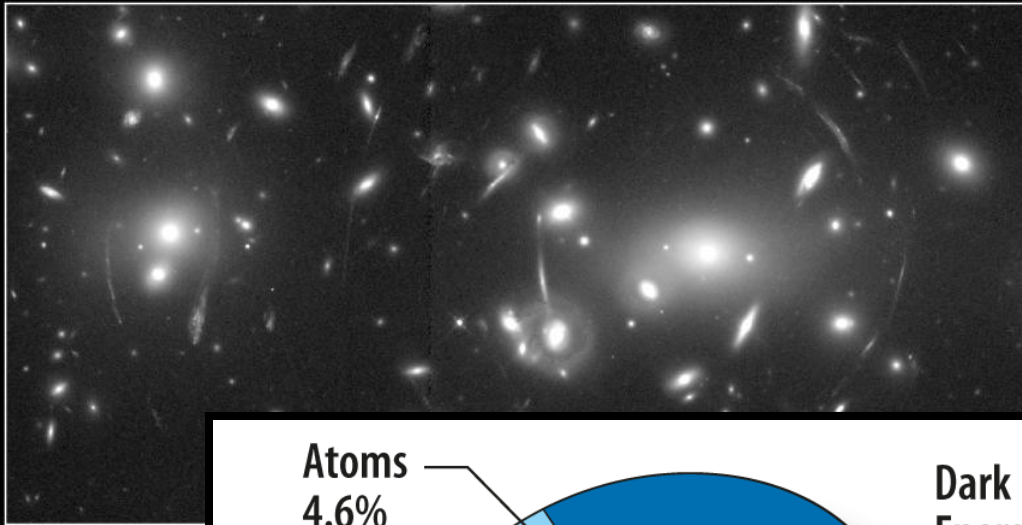
What are noncognitive skills?



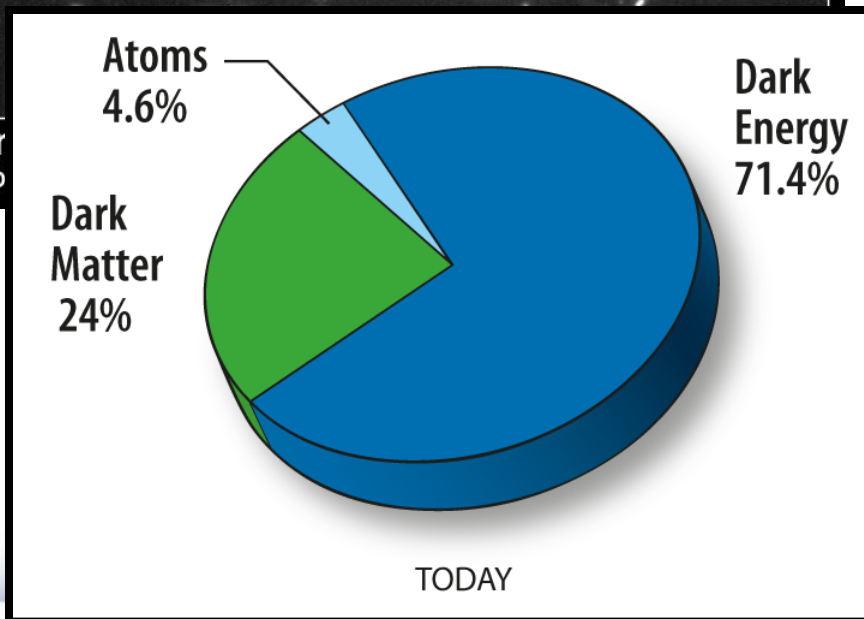
The Roots of “Noncognitive” Factors

- The term has been around since the 1950’s
- However, the modern impetus came about more recently:
 - Years of schooling predicts labor market outcomes—cognitive skills account for only 20%; therefore 80% of the “years of schooling” benefit is due to noncognitive skills (Bowles, Gintis, & Osborne, 2001)
 - GED holders have equal cognitive skills as HS grads, but have worse labor market outcomes, commit more crime (Heckman & Rubinstein, 2001)
- Economists adopted the term “noncognitive” because the effect wasn’t explicitly articulated by existing models.

A Lesson from Astrophysics



Gravitation
PF95-14 • ST Sci O



“This paper is written in the spirit of ‘dark matter’ research in astrophysics. We have established the quantitative importance of noncognitive skills without identifying any specific noncognitive skill. Research in the field is in its infancy. Too little is understood about the formation of these skills or about the separate effects of all of these diverse traits currently subsumed under the rubric of noncognitive skills.”

Heckman & Rubenstein (2001)

Efforts to Define the Space

The Big Five Personality Factors (Goldberg, 1990)

| <u>Domain</u> | <u>Descriptors</u> |
|---------------------|------------------------------------|
| Extraversion | • talkative, sociable, outgoing |
| Agreeableness | • tolerant, courteous, trustworthy |
| Conscientiousness | • industrious, reliable, orderly |
| Emotional Stability | • self-reliant, calm, confident |
| Openness | • perceptive, artistic, curious |

- The creation and adoption of this model has facilitated much of the research and understanding of noncognitive skills (Kyllonen, 2013).
- Many existing frameworks find roots in the Big Five (e.g., Robbins et al., 2004; Markle et al., 2013).
- Still, many practitioners do not like “noncognitive.”
- Other terms include: affective, 21st century, or psychosocial skills/factors; grit, character, hope.

An Example Framework

| <i>General Skill</i> | <i>Subskill</i> | <i>Definition</i> | <i>Example Items</i> |
|--|------------------------------------|--|--|
| Academic Skills Tools and strategies for academic success | <i>Organization</i> | Strategies for organizing work and time. | I make a schedule for getting my school work done. I take due dates seriously. |
| | <i>Meeting Class Expectations</i> | Doing what's expected to meet the requirements of your course including assignments and in-class behaviors. | I attend almost all of my classes. I complete the reading that is assigned to me. |
| Commitment Active pursuit toward an academic goal. | <i>Commitment to College Goals</i> | Perceived value and determination to succeed in and complete college. | One of my life goals is to graduate college. The benefit of a college education outweighs the cost. |
| | <i>Institutional Commitment</i> | Attachment to and positive evaluations of the school. | This is the right school for me. I'm proud to say I attend this school. |
| Self-Management Reactions to academic and daily stress | <i>Sensitivity to Stress</i> | Tendency to feel frustrated, discouraged, or upset when under pressure or burdened by demands. | I get stressed out easily when things don't go my way. I am easily frustrated. |
| | <i>Academic Self-Efficacy</i> | Belief in one's ability to perform and achieve in an academic setting. | I'm confident that I will succeed in my courses this semester. I can do well in college if I apply myself. |
| | <i>Test Anxiety</i> | General reactions to test-taking experiences, including negative thoughts and feelings (e.g., worry, dread). | When taking a test, I think about what happens if I don't do well. Before a test, my stomach gets upset. |
| Social Support Connecting with people and students resources for success | <i>Connectedness</i> | A general sense of belonging and engagement. | I feel connected to my peers. People understand me. |
| | <i>Institutional Support</i> | Attitudes about and tendency to seek help from established resources. | If I don't understand something in class, I ask the instructor for help. I know how to find out what's expected of me in classes. |
| | <i>Barriers to Success</i> | Financial pressures, family responsibilities, conflicting work schedules, and limited institutional knowledge. | Family pressures make it hard for me to commit to school. People close to me support me going to college. |

"21st Century Skills"

Cognitive

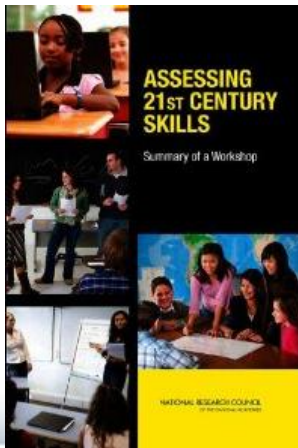
- (Non-routine) problem solving
- Critical thinking
- Systems thinking
- Study skills
- Adaptability
- Creativity
- Meta-cognitive skills

Interpersonal (social)

- Complex communication
- Emotional/ social intelligence
- Teamwork/ Collaboration
- Leadership
- Cultural sensitivity
- Tolerance for diversity

Intrapersonal (emotional, self-regulatory)

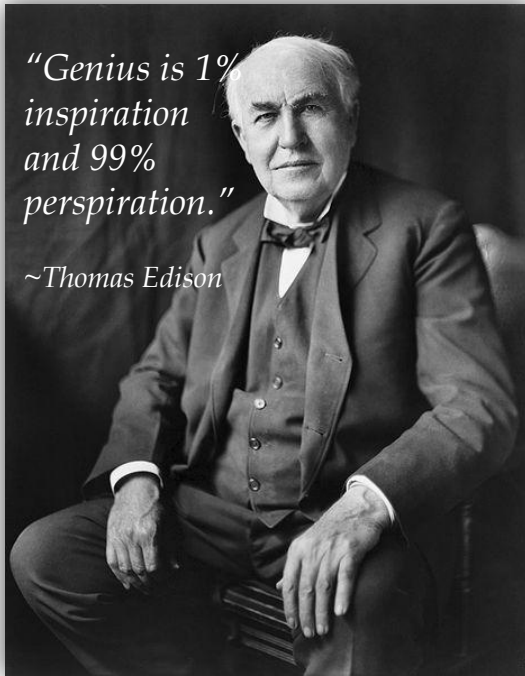
- Anxiety
- Self-efficacy
- Self-concept
- Attributions
- Work Ethic
- Persistence
- Organization
- Time management
- Ethics & Integrity
- Life-long learning



See: National Research Council
(2008; 2010; 2011; 2012)

RELEVANCE IN EDUCATION

The Cultural Importance of Noncognitive Skills



"It is common knowledge outside of academic journals that motivation, tenacity, trustworthiness, and perseverance are important traits for success in life."

Heckman & Rubenstein (2001)

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Espoused Importance: Synthesizing mission statements from 35 universities

- Knowledge, learning, mastery of general principles
- Continuous learning, intellectual interest and curiosity
- Artistic cultural appreciation and curiosity
- Multicultural tolerance and appreciation
- Leadership
- Interpersonal skills
- Social responsibility, citizenship and involvement
- Physical and psychological health
- Career orientation
- Adaptability and life skills
- Perseverance
- Ethics and integrity

Schmitt, Oswald, Kim, Imus, Drzakowski, Friede, & Shivpuri (2007);
Oswald, Schmitt, Kim, Ramsay, & Gillespie (2004).

Employers also care about noncognitive skills

| | Skill | % Important | % Prepared |
|---------------------|------------------------------|-------------|------------|
| <i>Cognitive</i> | English Language | 88 | 26 |
| | Mathematics | 64 | 18 |
| | Science | 33 | 15 |
| <i>Noncognitive</i> | Teamwork/Collaboration | 94 | 25 |
| | Professionalism/Work Ethic | 94 | 17 |
| | Ethics/Social Responsibility | 86 | 18 |

Conference Board/SHRM survey of >400 employers from across the United States
(Casner-Lotto & Benner, 2006)

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Listening. Learning. Leading.*

Interventions in K-12: Social & Emotional Learning

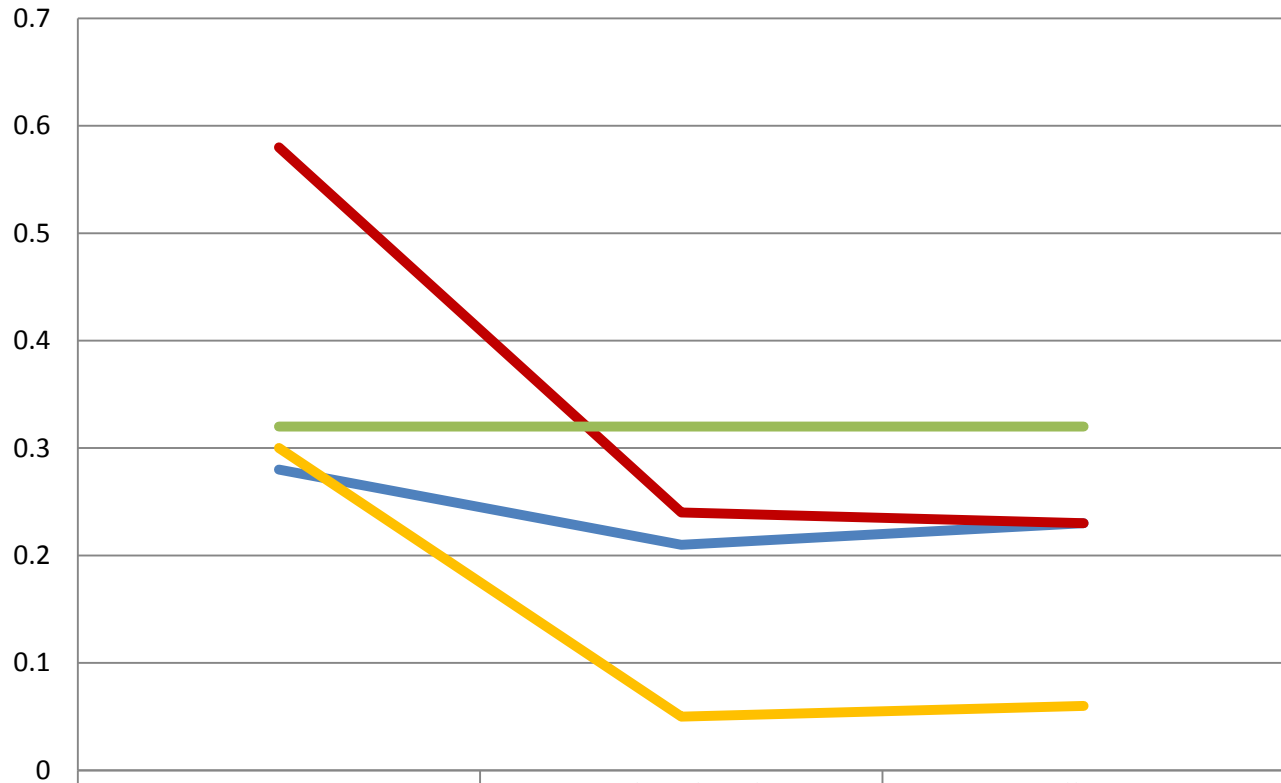
- Sizable movement in K-12 to expand the intended outcomes of education
- Educational interventions are characterized as seeking to:¹
 - foster resilience, foster self-determination, spirituality, self-efficacy, clear and positive identity, belief in the future, and prosocial norms (healthy standards for behavior).
 - promote social, emotional, cognitive, behavioral, and moral competence
 - provide recognition for positive behavior and opportunities for prosocial involvement
- Repeated meta-analyses have shown that SEL interventions:^{1,2}
 - Increase social-emotional outcomes,
 - Decrease negative outcomes (e.g., absenteeism, class misconduct, teenage pregnancy, substance abuse);
 - Increase academic achievement.

¹Catalano et al., 2002

²Durlak et al., 2013
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Poropat (2009) Meta-analysis

Correlation w/ Student Achievement



| | K-8 | High School | College |
|----------------------|------|-------------|---------|
| Conscientiousness | 0.28 | 0.21 | 0.23 |
| Agreeableness | 0.3 | 0.05 | 0.06 |
| Cognitive ability | 0.58 | 0.24 | 0.23 |
| Socioeconomic Status | 0.32 | 0.32 | 0.32 |

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| Construct | r_{GPA} | $r_{\text{retention}}$ |
|--------------------------|------------------|------------------------|
| Academic Skills | .129 | .298 |
| Academic Goals | .155 | .210 |
| Academic Self-Efficacy | .378 | .257 |
| Institutional Commitment | .108 | .204 |
| Social Support | .096 | .199 |
| | | |
| SES | .155 | .173 |
| ACT/SAT Scores | .376 | .079 |

Research shows that behavioral monitoring and intervention are key to student success

Developmental Education Class Success Rates Based on Math Readiness and In-course Behavior Levels

| | | Effort Level (participation, attendance, complete assignments) | | |
|----------------|--------|---|--------|-----|
| | | High | Medium | Low |
| Math Readiness | High | 96% | 91% | - |
| | Medium | 94% | 77% | 82% |
| | Low | 86% | 61% | 38% |

Success rate not calculated due to insufficient sample size

Success rates for students with low readiness but high effort more than twice as high as for low effort, low readiness

n=411

Source: Li, et al. (In press.)

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“Social-Psychological Interventions in Education: They’re Not Magic”

- It is a common misconception that personality is fixed after adolescence (Roberts, Walton, & Viechtbauer, 2006)
 - Malleability is key if interventions are to be effective
- Yeager, D.S., & Walton, G.M. (2011). *Review of Educational Research*, 81 (2), 267-301.
- Small interventions can lead to SIGNIFICANT outcomes, even months and years later (higher education examples)
- However, they must be:
 - Psychologically sound
 - Interactive
 - “Hidden”

CASEL

Collaborative for Academic, Social, and Emotional Learning
Roger Weissberg, U. of Illinois – Chicago

Figure 1. The Five Social and Emotional Learning Core Competencies



Figure 2. Outcomes Associated with the Five Competencies

SEL Approaches

- Explicit SEL Skills Instruction
- Integration with Academic Curriculum Areas
- Teacher Instructional Practices



SEL Skill Acquisition:
Five Competence Areas



Improved Attitudes
about Self, Others, and
Schools

Positive Social Behavior

Fewer Conduct Problems

Less Emotional Distress

Academic Success

[2013 CASEL GUIDE: Effective Social and Emotional Learning Programs](#)

Critical Domains for Higher Education Student Learning Outcomes

(Markle, Brenneman, Jackson, Burrus, & Robbins, 2013)

Creativity

- The generation of new ideas
- Novel integration of existing ideas
- Application of new ideas in a real-world setting

Critical Thinking

- Thinking critically
- Solving problems
- Synthesize information
- Sense-making

Teamwork

- Fulfill roles within a team
- Treat group members with respect
- Motivate group members
- Leadership skills

Effective Communication

- Effectively communicate multiple types of messages
- Communicate across multiple forms
- Effectively deliver messages to varying audiences

Digital & Information Literacy

- Accessing and finding information
- Analyzing and evaluating information
- Using and managing information
- Applying technology effectively

Citizenship

- Civic knowledge
- Participating in civic processes
- Action and organization toward change
- Respect for Others
- Ethics and Integrity

Life Skills

- Ability to organize and manage work for success:
- Independence Self-Directed Learning
- Time Management
- Goal Setting
- Adaptation, Flexibility

CURRENT AND FUTURE RESEARCH

This is the right school for me.

Strongly
Disagree



Disagree



Somewhat
Disagree



Somewhat Agree



Agree



Strongly Agree



I start tasks right away.

Strongly
Disagree



Disagree



Somewhat
Disagree



Somewhat Agree



Agree



Strongly Agree



Family pressures make it hard for me to commit to school.

Strongly
Disagree



Disagree



Somewhat
Disagree



Somewhat Agree



Agree



Strongly Agree

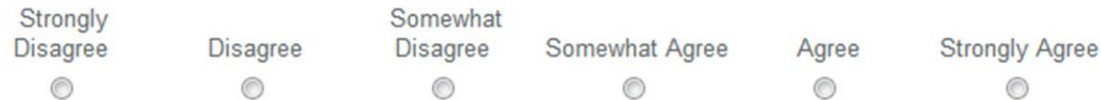


Self-Report (Likert) Items

- Students rate the extent that they agree with various statements
- Vast body of research supporting construct and predictive validity

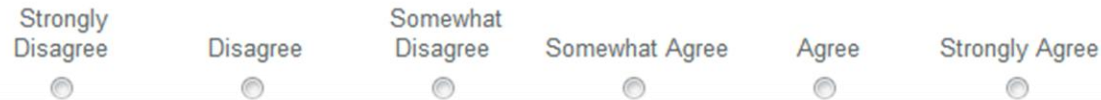
Carlos makes lots of lists and schedules to help organize his work. He attends every class and is fully prepared when he arrives.

Carlos is organized.



Lisa tries to follow schedules for getting her school work done, but sometimes rushes into things. Lisa is an active participant when she is in class.

Lisa is organized.



Anchoring Vignettes

- Students rate example students based on several behaviors
- Allows understanding of how each student uses the scale
- Measures influence of culture, background on responses

Read each statement below. Choose the statements that are most and least like you, then click and drag them into the appropriate boxes.

ITEMS

I overcome challenges and setbacks at school.

I take due dates seriously.

I make an effort in class.

MOST LIKE ME

LEAST LIKE ME

Forced-Choice Items

- From three statements, students select most and least like them
- Preferable to traditional, “self-report” items
- Questions about suitability for outcomes measures
- Combined with other measures, can indicate misrepresentation

You are feeling stressed about the amount of homework that you have been given by your instructor(s). Below are some ways that you might think, feel, or act in this situation, right at the time that you feel stressed-out. Rate how often you do each activity when you feel stressed. How do you think, feel, or act when you are stressed from having too much homework to do?

| | Strongly Disagree | Disagree | Somewhat Disagree | Somewhat Agree | Agree | Strongly Agree |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| I tell myself that this will never happen again. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I try to get organized to get on top of my homework. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I blame myself for having put off my homework. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I ask myself: "How could I have let this happen to me?" | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I convince myself: "This is not really happening to me!" | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| I get some sleep. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Scenarios/ Situational Judgment Tests

- Students indicate responses to various situations
- Represented here in self-report, but can also be criterion-based (i.e., right/wrong answers)
- Are a form of knowledge

The Big Remaining Questions (IMHO)

- Profiles of skills? (e.g., Markle & Steinberg, 2013)
- What role do noncognitive factors play for traditionally underserved populations (e.g., explanatory, compensatory)?
- How do we better measure these as skills and outcomes?

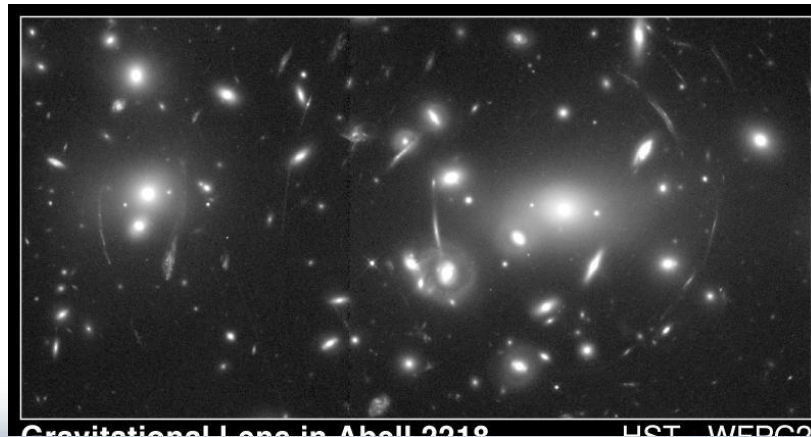
Conclusion

Support for the importance of noncognitive skills as both indicators and outcomes of education continues to grow.

This is an area of research that is vital to the success, growth, and development of our students, our schools, our economies, and our society. And still, a vast majority of research and practice focuses on mathematics and language skills.

**Noncognitive skills are things that matter
and things we can change.**

Let's remember to not just look where the light is shining.



Gravitational Lens in Abell 2218

HST, WFC2

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