

# Knowing Your Student's Likely Characteristics Improves Outcomes



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# Conclusions First



- ☞ Gifted and twice-exceptional individuals are a significant portion of our introductory physics students, especially the calculus-based sequence.
- ☞ Designing our courses with the characteristics of these gifted and twice exceptional students in mind improves the learning outcomes and attitudes of the students.

# Who are our students?



- ❧ Who are our introductory physics students?
  - Algebra-based and Calculus-based physics
  
- ❧ When we categorize students, we often sort by:
  - ❧ Math background\*\*
  - ❧ Major or Career focus
  - ❧ Gender
  - ❧ Ethnic or Cultural Background, Race
  - ❧ Age (Traditional/Non-traditional) or Year
  - ❧ Grade Point Average

# What is Our Goal?



- ❧ Why are we teaching this course?
- ❧ Why are students taking this course?
  - ❧ Generate Physics Majors and Minors
  - ❧ Content knowledge requirements for other majors or career paths
  - ❧ Academic Maturity and Academic Skill Sets
  - ❧ Satisfy General Education Requirements
  - ❧ To control student populations in other courses\*\*

For success, design with the students in mind....

# What is Gifted?



∞ **Gifted** = The Columbus Group definition from 1991:

*Giftedness is asynchronous development in which advanced cognitive abilities and heightened intensity combine to create inner experiences and awareness that are qualitatively different from the norm.*

∞ **High Achieving** = academically talented and mature, does not have the aptitude of a gifted student

∞ **Twice Exceptional (2e)** = gifted + special need

# Twice Exceptional



∞ Twice Exceptional (2e) = gifted + special need

A common example is extreme asynchrony:

-> several grades ahead in math while

-> reading disorder and unable to read at grade level

∞ 2e students are common in my college classroom

∞ Many 2e students have not had either of their exceptional statuses identified because of current RtI practices.

Their gifted status may be masked by their other needs such that only one or neither status is ever identified.

# Common Characteristics



- ❧ One or more overexcitabilities
- ❧ Highly sensitive
- ❧ Deep intense feelings
- ❧ Think in abstract, complex, logical ways
- ❧ Idealism and strong sense of justice beyond age peers
- ❧ Longer attention span and intense concentration
- ❧ Preoccupied with own thoughts
- ❧ Learns basic skills quickly with little practice
- ❧ Wide range of interests
- ❧ Highly developed curiosity
- ❧ Wants to experiment and do things differently
- ❧ Asks probing questions
- ❧ Puts ideas together in ways that are not typical
- ❧ Vivid imaginations
- ❧ Organize people and things in complex systems
- ❧ Underachievers, bored with routine
- ❧ Issues with perfectionism
- ❧ sense of humor
- ❧ Excellent memory
- ❧ Large vocabulary
- ❧ Complex sentence structure
- ❧ Enjoys solving puzzles and problems
- ❧ Different from the norm

# Overexcitabilities



## Overexcitabilities

are intense responses

to external or internal stimuli

and are normal for gifted students

## Categories:

Psychomotor

Sensual

Intellectual

Imaginational

Emotional



# Mythology of Gifted



## ❧ Myths abound so educate yourself.

❧ MYTH: Higher IQ means better or more successful.

❧ MYTH: Gifted don't need help;

They are fine on their own

❧ MYTH: *Best teaching techniques are the same for gifted as for other student populations*

❧ MYTH: Gifted persons always achieve high grades

❧ MYTH: Gifted persons are always happy,  
always well adjusted in school

❧ MYTH: *Gifted students like teaching others*

# More Myths



## ❧ Myths relating to CU Honors Students:

- ❧ MYTH: Have it easy, don't have to be taught, they just get it.
- ❧ MYTH: Are so smart they don't have to work hard.
- ❧ MYTH: Never make mistakes, are always perfect.
- ❧ MYTH: Easy to identify as gifted.
- ❧ MYTH: Can solve their own problems on their own.
- ❧ MYTH: Can fit in easily anywhere because of lots of interests.
- ❧ MYTH: Have lots of close friends.
- ❧ MYTH: Are confident in themselves.
- ❧ MYTH: Have good study skills.
- ❧ MYTH: Have an easy time finding a job.
- ❧ MYTH: Are all the same, have the same skills.
- ❧ MYTH: All succeed with the same strategies.

# Success Strategies



- ❧ **Project based learning:** design your own labs, research a topic and share with the class
- ❧ **Hard work** is essential for success:  
build mental stamina with complex, multistep problems, encourage trying and then asking for help when stuck
- ❧ Strive for an **excellence mindset** rather than expecting perfection:  
allow revisions of some work, overcome a fear of failure with lots of low risk assignments, reinforce mistakes are opportunities to learn, create a non-competitive class environment
- ❧ **Non-traditional enrichment activities**  
disproportionately engage these students and provide opportunities to learn social, academic, and presentation skills

# Success Strategies



## ☞ Encourage Exploration of Study Skills:

- ☞ Assign grades to activities that promote the development of effective study skills needed for academic success (the paragraph summary story)
- ☞ Allow a multiple types of learning assessments and formats
- ☞ Reinforce **time management** skills by keeping regular due dates for homework and tests

## ☞ Goal Setting and Prioritization:

- ☞ Have students set short and long term learning goals
- ☞ Coach to help them figure out how to succeed in reaching goals

## ☞ Encourage Healthy Habits:

eat, sleep, exercise, stress management

- ☞ due dates at reasonable hours,
- ☞ bonus points for physics related habits  
(end of semester kinematics...walk, run, hop, skip, jump)

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# Giftedness



The Columbus Group definition from 1991  
is a good functional definition:

*Giftedness is asynchronous development in which advanced cognitive abilities and heightened intensity combine to create inner experiences and awareness that are qualitatively different from the norm.*

*This asynchrony increases with higher intellectual capacity. The uniqueness of the gifted renders them particularly vulnerable and requires modification in parenting, teaching and counseling in order for them to develop optimally. (Ruf. p. 31)*