 COLLEGE OF EDUCATION

BELIN-BLANK


Who Needs Math Acceleration?

California Association for the Gifted
March 2017

Ann Lupkowski Shoplik, Ph.D.,
Administrator, Acceleration Institute and Research
Belin-Blank Center for Gifted and
Talented Education

Nurturing Potential | Inspiring Excellence

Why is discovery and development of math talented students important?



- Over half of math talented students are learning math in the regular classroom.
- Students who are inappropriately challenged are at risk for disengagement.
- Overall test scores (such as IQ testing) may hide math talent; diagnostic testing is essential.
- Mathematically talented students have diverse academic needs and require different program options

Nurturing Potential | Inspiring Excellence

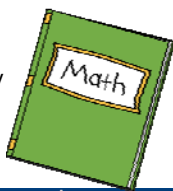
Modifications to Regular Programming

Options that are less appropriate	Why they are less appropriate
Tutor other children: Help others who are having difficulty in math	This is not a good substitute for learning new material
Isolated, self-paced instruction: Student works ahead in the textbook at his/her own pace	May result in feelings of isolation; student probably won't learn the material well

Nurturing Potential | Inspiring Excellence

Modifications to regular programming

- More appropriate options:
 - Breadth/Depth approach: The same curriculum, greater depth
 - Enrichment topics
 - Math-related independent study projects



Nurturing Potential | Inspiring Excellence

Modifications to regular programming

- More appropriate options (2)
 - Curriculum compacting
 - Subject-matter acceleration in mathematics
 - Ability grouping: Groups of advanced students study math together, grouped within the regular classroom, or an entire group of math talented students might study math together.

Traditional Sequence

	Grade	Grade
Algebra I	8	9
Geometry or Algebra II	9	10
Geometry or Algebra II	10	11
Algebra III/Trigonometry	11	12
Calculus I or AP Calc AB	12	-
Discrete Math or Linear Algebra or Differential Equations	-	-
Calculus II	-	-

www.nationempowered.org



Graphics by Lori Ihrig

Subject Acceleration in Math

- Move up a grade for math
 - Curriculum compacting
 - Take a summer course in math
 - Take an online math course
 - Take Advanced Placement courses
 - Dual Enrollment
 - DT->PI Model: individualized, accelerated program
- The goal is to match the curriculum to the **level and pace** the student needs

Subject (Content-Based) Acceleration

- For students who:
 - Demonstrated academic ability in one or more academic areas
 - Are not recommended for whole-grade acceleration
- Benefits students with uneven academic profiles who need acceleration in the area of their strength
- May have already skipped a grade but need additional acceleration in extreme strength area

Nurturing Potential | Inspiring Excellence

Why Not Accelerate Students in Content Areas? **Excuses:**

- “Acceleration may cause academic harm.”
 - Response: High ability students engage in abstract thinking at a younger age.
 - Response: Accelerated students do not have gaps in their academic backgrounds
 - Response: Accelerated students will not run out of courses before h.s. graduation
 - Response: Accelerated students do not “burn out.” Acceleration leads to higher levels of achievement.

Nurturing Potential | Inspiring Excellence

More **Excuses...**

- What about the Common Core and the Next Generation Science Standards?
The new standards are advanced...
 - But they were not designed with highly capable students in mind.
 - Some students will traverse the standards before the end of high school, which will require educators to provide advanced content for them.

Nurturing Potential | Inspiring Excellence

Still More **Excuses...**

- We already have enrichment.
 - STEM clubs, science fairs, English festivals, and pull-out programs provide valuable enrichment.
 - But they do not provide a **systematic progression** through the curriculum



See www.nationempowered.org

Nurturing Potential | Inspiring Excellence

Advantages of Subject-Matter (Content Based) Acceleration

- Regular classroom teacher does not have to search for materials for the advanced student, because that student is removed during math class
- It is more likely that the student will be grouped with intellectual peers
- Student receives credit for work completed
- Student is appropriately challenged and therefore remains interested in the subject (and in school)



Nurturing Potential | Inspiring Excellence

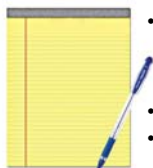
Disadvantages of Subject-Matter Acceleration

- The pace may still be too slow
- If only one year of acceleration, **there may be little new content**
- Long-term planning is essential, so the student does not “run out” of coursework before graduating from high school.
- Student may not receive credit for high school courses completed before enrolling in high school due to district policies.



Nurturing Potential | Inspiring Excellence

What are some administrative questions related to content acceleration?



- How are grades and credit assigned?
- When completing the school's regular testing, which grade-level achievement test does the student take (“age-appropriate” or new grade)?
- What transportation is needed?
- How do we schedule math at the same time for the two grade levels?
- What indicators of accelerated coursework are needed on the student's transcript?
- How is class rank determined?

Nurturing Potential | Inspiring Excellence

Some Tools Used to Make and Support Decisions about Acceleration

- The Talent Search Model
- The Diagnostic Testing -> Prescriptive Instruction Model
- Belin-Blank In-School Testing/I-Excel online test
- IDEAL Solutions for STEM Acceleration
- Iowa Algebra Aptitude Test and Orleans-Hanna Algebra Prognosis Test
- Distance Learning Programs (IOAPA)



Nurturing Potential | Inspiring Excellence

How do we identify students for content acceleration?



- Gathering the data:
- Grade-level achievement test subtest scores \geq 95th %ile (Iowa Assessments, Terra Nova, etc.)
- Can use profile scores on CogAT
- Proficiency-based testing. Can use end-of-year and end-of-chapter tests.
- Above-level testing (two or more years above)
- Teacher ratings/observation
- Child study team recommended for these decisions as well

Nurturing Potential | Inspiring Excellence

How do we determine the level of academic talent?

- Ability/Aptitude Tests
- Examples:
 - Cognitive Abilities Test (CogAT)
 - Above-level tests (test designed for older students)
 - I-Excel
 - ACT or SAT
 - Note: IQ tests aren't designed to help us discover exceptional mathematical ability

Nurturing Potential | Inspiring Excellence

Why test?

1. Determine the level of talent in a specific content area
 - Who are the 'talented' students?
 - Who are the 'exceptionally talented' students?
2. Determine what they have already learned
 - pre-test, then tailor instruction so we don't spend time on what they already know
 - Helps to address the problem of "gaps" when accelerating
3. Determine if they have learned what we set out to teach

Nurturing Potential | Inspiring Excellence

Above-Level Testing: The Talent Search Model

- Start with students who have earned high scores (95th percentile or above) on **grade-level tests** (e.g., the *Iowa Assessments*)
- Administer a test developed for older students
 - Example: Administer *SAT* or *ACT*, which were developed for 11th and 12th graders, to talented 7th - 9th and 6th.
 - Example: Administer *I-Excel*, which contains 8th grade content, to 4th-6th graders

Nurturing Potential | Inspiring Excellence

Above-level testing differentiates “talented” students from “exceptionally talented” students

Section A shows the percentile rank on a grade-level achievement test.

The students we are focusing on scored at the 95th percentile or above.

Nurturing Potential Inspiring Excellence

Above-level testing differentiates “talented” students from “exceptionally talented” students.

Section B shows how the above-level test “spreads out” the scores of the academically talented students. Some students earn low scores, most earn average scores, and some earn high scores.

Nurturing Potential Inspiring Excellence

Example of two students

4 th grade test scores		
Katherine	99 th percentile on most sections of grade-level test (<i>Iowa Assessments</i>)	
Margaret	99 th percentile on most sections of grade-level test (<i>Iowa Assessments</i>)	
5 th grade I-Excel-Mathematics scores (percentile ranking compared to 8 th grade norms)		
Katherine	20	(96 th percentile)
Margaret	10	(12 th percentile)

Nurturing Potential Inspiring Excellence

Advantages of Above-Level Testing

- Educational diagnosis (above-level test is a more accurate measure of ability)
- Educational recommendations tailored to the abilities of the student
- Educational opportunities

Nurturing Potential Inspiring Excellence

What the Belin-Blank Center Offers

- 7th-9th graders: Traditional talent search. Parents register students for **ACT** through the Belin-Blank Center. Students go to a nearby test center. Parents receive detailed interpretation of scores through Belin-Blank Center.
- 4th-6th graders: **I-Excel** test. We work with schools to set this up.
- Individual 4th – 6th graders: **I-Excel**. Parents need to identify an educator who will proctor the test locally. No open national dates.

Nurturing Potential | Inspiring Excellence

I-Excel



- Science, Math, Reading, English
- Contains 8th grade level items
- Used as an above-level test for 4th-6th graders
- www.i-excel.org



Nurturing Potential | Inspiring Excellence

I-Excel...

- ...is an online test for very capable 4th – 6th graders
 - uses an online platform developed by the Belin-Blank Center for use as an above-level assessment
- ...licenses content developed by ACT
 - that was designed to measure academic progress of junior high students.
 - From that content, Belin-Blank has been identifying the academic talents of bright 4th- 6th grade students for over 20 years.
- ...provides the power of above-level testing

www.i-excel.org

Nurturing Potential | Inspiring Excellence

What can we do with the test results?

- Some students score extremely high on the tests
- Some students earn lower scores
- Program options should reflect those differences



Nurturing Potential | Inspiring Excellence

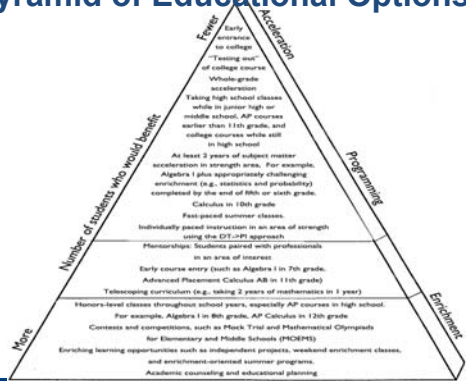
Powerful information from Above-Level Testing

- For example, the **Pyramid of Educational Options** links test scores to specific educational options ranging from less accelerative to more accelerative (e.g., honors classes, mentorships, subject acceleration, grade-skipping, fast-paced classes)



Nurturing Potential | Igniting Excellence

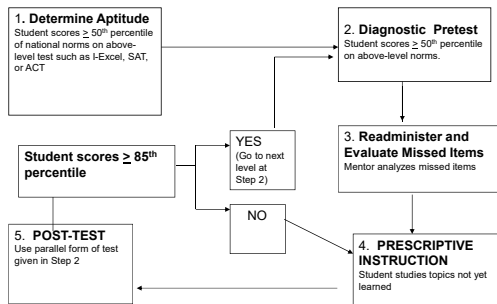
Pyramid of Educational Options



Nurturing Potential | Igniting Excellence

WHAT IS DIAGNOSTIC TESTING -> PRESCRIPTIVE INSTRUCTION?

Diagnostic Testing->Prescriptive Instruction The DT->PI Model



Model originally developed by Julian Stanley (Stanley, 1978). Versions of this model have appeared in numerous publications, including Lupkowski & Assouline (1992) and Assouline & Lupkowski-Shoplek (2005, 2011).

Nurturing Potential | Igniting Excellence

When Is a Mentor Program Really Useful?

- When enrichment & differentiation in the regular classroom cannot provide the challenge that math talented students need.
- When moving students up a grade level for mathematics isn't enough.
- For students who **want** and **need** more challenge in math.



Nurturing Potential | Inspiring Excellence

Advantages of a Math Mentor Program

- The mentor can provide more accurate answers than peers can.
- The mentor has the ability to extend the student's questions or ask new questions.
- The student is able to progress systematically through the math curriculum.



Nurturing Potential | Inspiring Excellence

Sample Program: North District

- Hired an "Elementary Math Mentor" full time
- Students were selected for this program based on above-level testing
- Mentor meets with students 2 days per week for 45 minutes each time
- Assigns homework for other times, which they complete during regular math class
- Goal is to accelerate by 1 year in math



Nurturing Potential | Inspiring Excellence

North District: Challenges

- Elementary Math Mentor must travel to 5 different buildings each day
- Stated goal was 1 year of acceleration. Some students need more. "Not allowed."
- What happens to students after 6th grade? District responded by hiring a High School Math Mentor so students could continue accelerated math. Once they reach the high school building, it's easier to place them in the correct level of math.

Nurturing Potential | Inspiring Excellence

Another example: County Schools

- All students are pre-tested before each unit.
- Assigned to 1 of 3 flexible groups: Concept Development, Skills, or Extension
- Extension group often covers the material more quickly. Remaining time is for planned enrichment.
- School district goals do **not** include acceleration for these students: that is the next step in their program planning.

Nurturing Potential | Inspiring Excellence

Some other useful tests

Nurturing Potential | Inspiring Excellence

Cognitive Abilities Test

- [Riverside Publishing](#)
- Can use the [Quantitative Aptitude](#) section for measurement of math ability
- Administered by certified educator
- Can be used above-level
- Available for grades K-12
- Includes a gifted screening form
- [Ability profile interpretation system](#)

Nurturing Potential | Inspiring Excellence

Iowa Algebra Aptitude Test

- Specific readiness for learning algebra
- Used for placement in pre-algebra or algebra course
- Group or individual test
- Administered by certified educator
- Usually administered to grades 7-8, but **useful as above-level test for grades 4-6**
- [Riverside Publishing](#) or through the Belin-Blank Center

Nurturing Potential | Inspiring Excellence

Orleans-Hanna Algebra Prognosis Test

- Predict student readiness for learning algebra
- Group or individual test
- Administered by educator (Master's degree in education or related field)
- Usually administered to grades 7-8, but **useful as above-level test for grades 4-6**
- Pearson

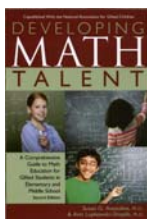
Nurturing Potential | Inspiring Excellence

Distance Learning Programs

- Gifted Learning Links (CTD, Northwestern)
- CTYOnline (CTY, Johns Hopkins)
- GiftedAndTalented.com (was Stanford EPGY)
- Iowa Online Advanced Placement Academy (online AP courses in a program called **IOAPA** at the University of Iowa)
- University of Nebraska High School

Nurturing Potential | Inspiring Excellence

Developing Math Talent



Assouline & Lupkowski-Shoplik.
Prufrock Press.

Describes above-level testing, Talent Search Model, DT->PI model, and curriculum options for math-talented students in great detail.

Nurturing Potential | Inspiring Excellence

Additional Resources

- Acceleration Institute, www.accelerationinstitute.org
 - Resources for making decisions about grade-skipping
 - Resources for making decisions about subject-matter acceleration
 - Acceleration policies
 - Links to *A Nation Empowered* and *A Nation Deceived*

Nurturing Potential | Inspiring Excellence

Take-Home Messages

Problem	Solution
Disengagement	Challenging curriculum
Overall scores hide math talent	Diagnostic testing
Diverse academic needs	Varied program options: Don't try to fit the program to the student. Rather, develop a program in response to a student's needs.
Discovery and development of mathematical talent	Don't look for the easy fix. Just do it!

Nurturing Potential | Inspiring Excellence

Follow us!

- Follow us on Twitter [@belinblank](#)
- Like us on Facebook [facebook.com/ BelinBlank](#)
- Read our blog: [belinblank.wordpress.com](#)
- Subscribe to our newsletter: [www.belinblank.org/newsletter](#)



Nurturing Potential | Inspiring Excellence

Questions?



- Ann-Shoplik@uiowa.edu
- Twitter: [@AnnShoplik](#)


Nurturing Potential | Inspiring Excellence

NEW! Bucksbaum Early Entrance Academy



- Early Entrance to college program for students from any state who have completed 10th or 11th grade
- A great opportunity to get an early start on a college degree from a highly respected Division 1 Research Institution
- Building upon 16 years of experience with the early entrance program: the National Academy of Arts, Sciences, and Engineering
- Located at the Belin-Blank Center, The University of Iowa
- Questions? Email Jan Warren: jan-warren@uiowa.edu

Nurturing Potential | Inspiring Excellence


**COLLEGE OF
EDUCATION**

BELIN-BLANK

Take Graduate Classes in Your PJs!
Online Courses in Gifted Education


- Cost of courses starts at \$297 (undergraduate credits)
- Register for one or more classes. Spring 2017 courses include:
 - Program Models in Gifted Education (3 semester hours)
 - Identification of Students for Gifted Programs (3 s.h.)
 - Topics: Smart Girls in the 21st Century (2 s.h.)
 - Administrative & Policy Issues (2 s.h.)
 - Thinking Skills (1 s.h.)
 - Ethics & Cultural Issues / Giftedness (1 s.h.)
 - Math Programming for High Ability Learners (1 s.h.)
 - Leadership Skills for G/T, K-12 (1 s.h.)

Ready to Get Started?

- More details at: belinblank.org/educators
- New students should visit www.belinblank.org/EdReg and follow the directions to register as a Continuing Education student.
- You need a computer and a reliable internet connection. Many courses provide all necessary course materials. For others, you will need to purchase a text.
- No travel requirements. Online courses can be completed at home.
- Questions? Laurie Croft, Assoc Dir, Prof Devel: Laurie-Croft@uiowa.edu

More Professional Development Opportunities

- Webinars: belinblank.org/webinar
- Summer professional development: belinblank.org/educators
- Free online letters for educators: belinblank.org/letters



- Learn about gifted education when and where it's convenient for you
- Move up the salary scale in your district with graduate coursework
- Courses can apply to an endorsement or to a Master's Degree

Nurturing Potential | Inspiring Excellence