Educational Needs of Academically Talented/Highly Able Youth


Academically talented students were found to have precocious reasoning abilities and to be ready for advanced math earlier than when it is typically offered. This study examined above-grade-level abstract reasoning abilities of 150 students ranging from 2nd to 6th grades. Students’ scores on the Arlin Test of Formal Reasoning were found to be equivalent to those for a normative group of students four grade levels higher. The understanding of various abstract concepts varied by age for only 4 of 8 sub scales or concepts: Probability, Proportion, Momentum, and Frames of Reference. Performance varied widely within age level for the understanding of Volume, Correlation, Combination, and Mechanics. There may not be one age at which children acquire abstract reasoning and are ready for advanced mathematics. Therefore, identification of students for placement into algebra should be done on a case-by-case basis.


Thirty-two 5th and 6th grade academically advanced students were selected on the basis of extraordinary reasoning ability (primarily verbal) to participate in a pull-out program. Twenty students of similar ability served as a control group. All subjects were given a pre- and post-test of reading comprehension and vocabulary from the advanced level of the Sequential Tests of Educational Progress--Series III, and the Coopersmith Self-Esteem Inventories. The achievement test scores of students in the program showed significant gains in both reading comprehension (including inference skills) and vocabulary. Similar gains were not found for controls. Self-esteem scores for both groups remained constant with no significant gains or losses.


The article discussed the 1991 and 1992 programs of the Baltimore and Washington D.C. Community Outreach Project of The Johns Hopkins University Center for Talented Youth (CTY). The project’s two goals were to identify additional urban students who would qualify for the traditional CTY Summer Academic Programs, and to identify and serve other students whose substantial ability had previously gone unrecognized and, consequently, undeveloped. Major elements included the need to provide rigorous academic challenge to able students and adaptation of CTY’s Individually Paced Precalculus Mathematics Sequence course to the needs of the Community Outreach Project participants. In addition, student performance in Precalculus Mathematics and Algebra I Survey is discussed with analysis of the substantial gains demonstrated after these special programs.


Two studies were conducted to determine (1) whether differential educational experiences contribute to differential growth on Scholastic Aptitude Test (SAT) scores and (2) whether such experiences must occur over a long rather than a short duration to have impact. Specific content knowledge in mathematics/science and verbal areas taught during a short time interval did not increase SAT-M and SAT-V scores even when the content was of the type required to solve SAT problems. Exposure to academically rigorous educational experiences over a long time period (5 yrs.) did relate to the development of abilities measured by the SAT. In addition, students who experienced very large gains on the SAT over this 5-year period, in comparison with students with small gains, were achieving better in a more rigorous program of high school courses in mathematics and science for the SAT-M and in verbal areas for the SAT-V. Results support the position that educational experiences over time influence SAT scores.

Community School District 22 Brooklyn, New York, in cooperation with the Center for Talented Youth (CTY) of the Johns Hopkins University, has established a mathematics project based on CTY pedagogy and philosophy in three District 22 intermediate schools. The project included training five sixth-grade teachers at a CTY Summer Programs facility. During this time, adaptations of CTY’s Diagnostic-Testing/Prescriptive Instruction (DT-PI) model of instruction were developed to address the needs of the individual schools. All of the 165 students in the project completed at least as much mathematics as required in the current sixth-grade curriculum in District 22, maintaining a level of mastery of at least 90%. 116 students actually ended the year at various points in the seventh-grade prealgebra curriculum and 19 students progressed on into Algebra.

The success of the first year of the project has convinced both teachers and administrators to:

1. expand the project; and
2. in the second year, serve both sixth- and seventh-grade students at the three original schools, and sixth graders at two additional schools, for a total population of 458 students.

The success of the Community School District 22 Math Project illustrates the applicability of the DT-PI model in a public school setting. A pedagogy which takes into consideration the prior knowledge, ability, learning style, and motivation of each individual student, and tailors instructional strategy to satisfy their needs, is appropriate for a broad spectrum of student ability. This model, appropriately called “Optimal Match” and championed by CTY, has demonstrated its validity outside CTY’s very selective environment.


The book first reviews the ups and downs of American interest in the problems of talented children, then carefully explains the approach used at CTY, which emphasizes flexible pacing, opportunities for individual inquiry, academic rigor, creative teaching, and the use of otherwise off-the-shelf curriculum materials. In connection with nine interesting case studies, the authors vividly explain the crucial drawbacks in our current educational system, and how clear improvements can be workably introduced.


Concern about gender differences in mathematical achievement has led to numerous interventions to help females achieve at a higher level. This study assessed the impact of three different types of special programs at the junior high school level upon the he mathematics course-taking behavior and attitudes of highly able girls. The treatment assessed included two programs held on the Johns Hopkins University campus for 7th grade girls, a 1977 summer career awareness class and a 1973 summer accelerated summer mathematics program, as well as four school-system based programs held between 1974 and 1978. The study included a control group of high ability students who had not participated in these programs.

Results showed that special programs for the mathematically gifted do have an impact on the course-taking behaviors and plans and aspirations of girls. Girls who participated in special school system accelerated mathematics classes achieved as well as boys in these classes and had strong commitments to studying advanced mathematics courses. Girls who participated in a program that included a career awareness component and exposure to female role models had higher levels of educational aspiration than boys or girls who received no treatment or an accelerated program only. Girls who participated in any of the treatment programs were less likely than girls not in the programs to have weak career commitments for their lifestyle plans. Boys and girls differed little in attitudes toward mathematics with the exception that girls, even in this highly able group, exhibited less confidence in their mathematical abilities.


This article analyzed the relative contribution of age, gender, verbal reasoning ability (VRA), and mathematical reasoning ability (MRA) as predictors of success in fast-paced science courses. 562 boys and 203 girls (mean age 14.3 years) enrolled in science courses (biology, chemistry, or physics) were administered a test following the completion of the
Scores on the Scholastic Aptitude Test (SAT) verbal and math sections were also used as indicators of VRA and MRA. A composite of VRA and MRA was found to be a more powerful predictor of success in a fast-paced science course than any of the variables considered separately.


This study of 905 academically talented students (ages 12-16 years) who completed a one-year course in high school biology, chemistry, or physics in a three-week summer program found that the fast-paced courses effectively prepared subjects to accelerate in science and that talented students could begin high school sciences earlier than generally allowed.


The Model Mathematics Program was designed to meet the needs of gifted students in the area of math. This article documents results from the first 6 years of the project. Elementary and middle school students showed significant growth in math computation skills and concepts after receiving math instruction in flexibly paced math classes. Other outcomes included increased participation and improved performance in math competitions, and regional and state-wide recognition.

This study was designed to explore characteristics of exceptional teachers of gifted students. Participants included 63 teachers and 1,274 highly able students. Teachers responded to 2 measures: a background questionnaire and the Myers Briggs Type Inventory (MBIT), a self-report personality inventory. Students also completed the MBTI. In response to the background questionnaire, the majority of teachers reported holding advanced degrees in a content area; most were not certified to teach and reported completing no formal coursework in gifted education. Results from the MBTI indicated that exemplary teachers were more likely to prefer N (intuition) and T (thinking), as compared to a normative teacher sample. The personality types of teachers were in many ways similar to the personality types of the gifted students. These findings suggest that teachers who are judged to be highly effective in working with gifted students prefer abstract themes and concepts, are open and flexible, and value logical analysis and objectivity. Results suggest that teacher personality and cognitive style may play a role in his or her effectiveness in teaching gifted students.


After participating in a 3-week individually paced precalculus or science course, 892 academically talented high school students were surveyed about academic credit and/or course placement for their independent work. Findings indicated that most students received credit or placement or both, with more awards for placement than credit. Placement/credit was related to Scholastic Aptitude Test scores, gender, type of school, and grade level. As current educational reforms are being examined, educational resources that are available outside of school for special populations should be considered.


Third through sixth-grade mathematically talented students (n=306) enrolled in a flexibly paced mathematics course made achievement gains far beyond the normative gains expected over a one-year period. When compared to students several grade levels higher, these highly able students gained as much as 46 percentile points from pre- to post-
testing. Above-grade-level testing revealed that the students possessed a wide range of mathematics knowledge prior to entering the course, with some students scoring at exceptionally high levels. With an individualized learning pace, some students as young as 4th grade completed the arithmetic/prealgebra sequence in their first year and returned the second year to successfully complete the beginning algebra sequence. Restricting such students to a rigid instructional pace and a “grade-appropriate” curriculum may place them at risk for declines in motivation and achievement.


Nine months after participating in a 3-week individualized, flexibly-paced precalculus course, 218 academically talented students who received placement into a subsequent advanced math course completed a questionnaire assessing perceived preparation for advanced level work, grades received in the placement course, and perceived challenge of the individually-paced course relative to the placement course. The students experienced greater challenge in the precalculus course than in their school placement course. Self-reported grades, as well as perceptions of preparation for advanced level study, suggest that IP courses prepare students to be successful in placement courses in their school. Mathematics courses which allow students to proceed at a pace of learning matched to their abilities, followed by appropriate placement in their schools, provide an educational opportunity to meet the special academic needs of talented students.


This paper reviews the Richmond (Virginia) Young Students Mathematics Class, sponsored by the Center for Talented Youth of Johns Hopkins University for upper elementary students. Student selection, course content and approach, instructional methods, staffing, student outcomes, student and parent reactions, and implications are discussed.
Writing Skills (WS) workshops are process-oriented; they assume that students have important information to communicate and investigate the means by which ideas are communicated. WS provide tools for verbally gifted children; they facilitate a precocious interest in a specific subject at a rate more accelerated than what is usually available. Some emphases used in WS I and II are: eliminating verbosity and redundancy; diction; syntax; alliteration and assonance; metaphor and simile; analogy and conceit; and voice. Students who participate in WS demonstrate high performance on standardized tests. Seventy percent of students who participated in 2 semesters of WS achieved scores at or above the 86th percentile on the College-Level Examination Placement test.