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Inside

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When "Differentiated" Becomes Disconnected From Curriculum

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A common phrase in the field of gifted and talented education is "differentiated curriculum." Sometimes the adjective "differentiated" becomes disconnected from the noun "curriculum," and we find program offerings for high ability students that do not focus on curricular options. Students just have *different* things to do without any consideration for their entry level skills or behavioral characteristics. The assessment of such skills or characteristics is usually achieved by an elaborate screening and identification system that includes behaviors, anecdotes, performances, portfolios, tests, or ratings. Whatever form the records on each student may have taken, careful thought and documentation are integral to the process. Once the identification process is finalized, however, the data sometimes become inert. The data are not always the basis for future educational opportunities. It is important to pose the following question as part of the identification process:

> How are these data going to be used to develop curricular options for high ability students?

Years ago, Virgil Ward (1961) coined the term *differential education* for the gifted. He laid out a series of principles to guide the design of curriculum that would challenge the minds and abilities of students whose talents represented a wide spectrum. In later years, differentiated education or differentiated curriculum were the popular terms, as educators discussed educational opportunities for students. Differentiation gained a permanent place in the educational lexicon with the publication of the Marland report (1972). The report stipulated that gifted and talented students "require differentiated educational programs and/or services" (p. 2). This requirement was not explained in great detail. Educators "filled in the gaps" by rethinking earlier ideas or proposing new plans for differentiation.

The literature in the field is now replete with descriptions of differentiation. Categorical approaches of content, process, product, and affect are used by Kaplan (1986). These categories provide the basis for learning experiences. The resulting learning experiences are considered differentiated because they are a match among student needs, abilities, interests, and educational purposes. Kaplan reminds us, however, that "differentiation of curriculum and individualization of the curriculum are not similar. Once the curriculum is differentiated, it needs to be individualized for students"(p. 192).

Lists of principles of differentiation are also popular. Kaplan (1979) developed a framework for designing or developing curricular options. The principles included:

- Allow for indepth learning of a self-selected topic within an area of study
- Develop productive, complex, abstract and/or higher level thinking skills
- Encourage the development of products that challenge existing ideas and produce "new" ideas

Putting these principles into action is not an easy task. Curricular systems and models have been developed to address these principles

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and others to varying degrees (see Renzulli, 1986). We can adopt or adapt the systems and models as necessary, but the extent of this practice is in question. Results from several research studies conducted by The National Research Center on the Gifted and Talented have documented the limited extent to which curricular options are made available to gifted and talented students.

The Curriculum Compacting Study (Reis et al., 1993) illustrated that teachers could successfully identify students whose academic needs warranted curricular modifications. They could also use the compacting procedures to eliminate a modest to substantial amount of curriculum and still ensure the maintenance of skills over time. Teachers were very adept at the identification process and the instructional strategies, but, in some cases, they needed more help with designing or developing challenging curricular options.

The Classroom Practices Survey (Archambault et al., 1993) and the Classroom Practices Observations (Westberg et al., 1993) also pointed to the lack of attention to curricular options for students in third and fourth grade classrooms across the country. Archambault et al. (1993) summarized the results of survey data as follows: "It is clear from the results that teachers in regular third and fourth grade classrooms make only minor modifications in the curriculum and their instruction to meet the needs of gifted students" (p. 115).

Westberg et al. (1993) extended the survey to classroom observations. The observations supported the survey results. The researchers concluded that "despite several years of advocacy and efforts to meet the needs of gifted and talented students in this country, the results of this observational study indicate that little differentiation in the instructional and curricular practices is provided to gifted and talented students in the regular classroom" (p. 139).

Is it a matter of not knowing how to design curricular options, or are there so many competing priorities that attention is driven away from creating options and towards meeting the basic requirements of the district's curricula? Oftentimes, the coverage of material has become the standard for accountability without the recognition of the entry level skills of students and their concomitant educational needs. We have to shift our mindset to "less is *often* more." Indepth study of a fewer number of topics can be more meaningful than a cursory glance at numerous topics.

We continue to look at the results of former studies in light of emerging findings of current studies. As new findings become available, we reflect on the growing body of research. We still see a need to raise the following questions about all the data collected in comprehensive screening and identification systems:

- Where have all the data gone?
- How can these data be used to develop curricular options for high-ability students?

We addressed these questions with our first satellite presentation in 1992 on Curriculum Compacting as one approach to the differentiation of curriculum. This was followed by a second approach in 1993 that used the Six-Phase Model for the Explicit Teaching of Thinking Skills. We will continue to emphasize the importance of developing challenging educational experiences for all students. We will follow Feldhusen's advice for our next satellite presentation and develop "fast-paced, high-level, conceptually oriented learning activities, in large, challenging chunks taught in a dynamic and interactive style...." (p. 55). Look for our upcoming satellite presentation on "Curricular Options for High-End Learning" on Wednesday, May 11, 1994. We hope to reconnect the term differentiated to curriculum.

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NEWS Briefs Briefs briefs

The Stronghold Foundation is seeking talented at-risk ninth, tenth, or eleventh grade students who would benefit from the college preparatory environment of a private residential school. The foundation provides financial support for at-risk students to attend the Shattuck-St. Mary's School in Southern Minnesota, one of the premier boarding schools in the nation. Applicants should have B or better grades, although having a variety of interests is important. Students are being sought who are able to proceed through advanced degrees and serve as future leaders and role models. For more information and application materials contact: Stronghold Foundation, 3008 Dartmouth Road, Alexandria, VA 22314-4824.

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The *1994 State of the States Report* is now available from the Council of State Directors of Programs for the Gifted. Based on 1992-93 state education agency data, the report covers state legislation, state fiscal requirements, state procedures on assessing and serving gifted students, and the impact of educational reform on services to gifted students. To receive a copy, send a check or money order in the amount of $35, payable to CSDPG to: CSDPG, c/o Donnell Bilsky, 901 Potomac Path, Austin, TX 78752.

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Teachers of grade 1-3 students may be interested in field testing a new interdisciplinary interest center focusing on bears. Educators interested in field testing the activities will receive 15 student activity cards, related resource lists, and an evaluation form. When the evaluation form is returned to the author, they will receive 10 additional student activity cards, a list of suggested informational texts and picture books, and suggestions for large group activities. To receive the free packet of field test materials, send a self-addressed 9" x 12" envelope with four postage stamps to: Debra L. Briatico, 352 Main Street, Bristol, CT 06010.

Computer users with Internet access and a gopher program may now access current research on performance-based assessment being conducted by The National Center for Research on Evaluation, Standards, and Student Testing (CRESST) at UCLA. The Internet gopher server contains the *Alternative Assessments in Practice Database*, which features alternative assessment measures that have been developed by most of the 50 states. In addition to the database, the server contains recent articles on new methods of assessment from the CRESST newsletter and abstracts of over 50 technical reports on alternative assessment. The CRESST Internet address is *gopher.cse.ucla.edu*. For additional information on the server or CRESST publications contact: UCLA, CSE/CRESST, Graduate School of Education, 405 Hilgard Avenue, Los Angeles, CA 90024-1522.

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A comprehensive collection of significant theoretical and empirical worldwide research on the recognition and development of the gifted and talented has been compiled in the *International Handbook of Research and Development of Giftedness and Talent*. The handbook includes contributors from 18 nations and covers the following topics on giftedness and talent:

- historical perspectives and perennial issues,
- conceptions and development of giftedness and talent,
- identification,
- programs and practices of nurturing the gifted/talented,
- examples of country efforts, policies, programs and issues, and
- present and future education efforts.

This comprehensive handbook is edited by Kurt A. Heller, Franz J. Mönks, and A. Harry Passow and is available for $175 from: Pergamon Press, Inc., Sales Department, 660 White Plains Road, Tarrytown, NY 10591-5153.

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A nationwide research project is being planned for the 1994-95 school year to assess the effectiveness of teacher training on improving elementary students' self-efficacy in mathematics. Participating schools will receive a one-hour video tape on classroom strategies which have been shown to increase student self-efficacy. They will also receive training handbooks for all participating teachers. For more information on becoming involved in the project contact: Del Siegle, The National Research Center on the Gifted and Talented, 362 Fairfield Road, U-7, Storrs, CT 06269, phone 203-486-0617.

High School Experiences of High Ability Males in an Urban Environment

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High ability students from culturally diverse populations have existed in large urban environments for generations; yet many do not achieve at levels appropriate for their ability. Before urban school districts can address the educational needs of culturally diverse populations, educators must acquire a better understanding of these students' educational needs. With this knowledge, policymakers can begin to plan educational programs which will not only effectively meet the needs of this changing population, but which will also improve the educational gains of all students. The problems addressed in this study, therefore, were how high ability students' needs were met in an urban school setting, and what factors distinguished high ability youth who achieved from those who underachieved?

This ethnographic study examined the high school experiences of 12 high ability, male teenagers in an inner-city school in Hartford, Connecticut. Data were collected through participant observation, ethnographic interviews, and document review. Descriptions of culturally diverse high ability students who achieved and underachieved emerged from the data analyses, as well as suggestions for meeting the needs of these high ability teenagers in their urban setting.

Grounded Theory Which Evolved

When examining the everyday challenges that young people in inner-city schools face in their struggle to achieve a better life, we realize that some who reach their goals face greater obstacles than others. A young man living in the projects may go to sleep each night with the sound of drunken neighbors outside his bedroom window, yet he is able to overcome his environment, graduate from high school, attend college, and later help his parents and seven younger brothers and sisters. Another young man who lives in a more peaceful community and faces less hardship may never get beyond the tenth grade. His climb should certainly be an easier journey. Why doesn't he succeed?

The story of the high school student from the inner-city housing project who succeeded is inspirational, and we can assume that he must have developed personal strategies to overcome his adversity that can be shared. There are young people in our public schools who look at life and know what they want. They have developed a strong belief in themselves which provides them with the energy, the drive, and the tools they need to face challenges. This strong belief in self is the driving force which allows them to succeed in school and in later life. They are successful because they have determined who they are, and they have confidence in themselves.

In this study, grounded theory emerged to explain the differences in the life experiences of high ability achievers and high ability underachievers. In the life stories of the high ability achievers in the study, one trait which consistently appeared was a "strong belief in self." Several qualities merged to form this belief: sensitivity, multicultural appreciation, inner will, and aspirations. Part of the strong belief in self was a heightened sensitivity. This quality allowed them to appreciate individual differences in people around them, the beauty of language in a poem, or a relationship with a younger handicapped child learning to swim. They knew they were sensitive and appreciated that quality within themselves. With that sensitivity was an appreciation for people from a diversity of cultures and an appreciation for the racial diversity of their high school peers. They knew that their association with people of diverse cultural backgrounds provided them with more opportunities to understand humanity, and with this knowledge of diverse people, they came to understand themselves and to believe in themselves. Also, they had an inner will that fed the strong drive needed to reach

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for their goals. This strong belief in self naturally incorporated aspirations which included dreams, goals, and visions of a future where they were helping make the world a better place. Through their strong belief in self, they knew they would reach their goals and realize their dreams.

This strong belief in self was reinforced in the high ability achievers in three ways. First, they were supported by a variety of adults who helped them understand that their struggle to succeed was a worthwhile effort. These young men were nurtured by adults who cared, supportive teachers who inspired, counselors who listened and believed in them, and coaches who thought of them as more than just athletes. All of these adults impacted how these students saw themselves and whether they would achieve their goals. Along with adults who cared, they had families who supported them and their abilities. One young man had a family who prayed together and provided him with a deep spirituality. Others had parents who faced economic hardships but believed that tomorrow would be better and helped inspire their sons to believe that they too would see a better day. Along with their strong families and other supportive adults in their lives, these young men became involved in a variety of experiences which allowed them to develop their talents and to be exposed to the world beyond their urban communities. The combination of family support, support from significant adults, and experiences in which they began to see themselves as valued individuals strengthened their belief in self until they knew they were well prepared to succeed.

While the achievers in this study were successful in high school, a second group of high ability young men was not. The perplexing issue is why these young people who came from a similar environment, had similar cultural backgrounds, experienced similar types of families, and had similar access to support systems in their school and community did not succeed. They vacillated in their journey, became filled with despair, were confused, and eventually ended up losing site of their goals.

The high ability underachievers shared life stories filled with negative curricular and counseling experiences which were combined with problematic family issues. These problems grew

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more serious and had a rippling turmoil effect on the their high school experiences. The students grew to dislike school when they encountered teachers who did not address individual learning styles by modifying the curriculum to meet their needs. Issues at home, such as being overshadowed by a very intelligent, outgoing older sister or a straight A younger brother; a parent who drank heavily; or a religious belief system that was out of alignment with the values system of older siblings compounded the problem. All of these issues caused turmoil in the daily experiences of the young men who were already facing a dismal experience in school. The problems grew worse as the underachievers turned to the negative environment of other young people very much like themselves for excitement and a sense of well being.

One young man was intrigued with gangs, while another and his peers were in constant trouble in study halls and in the in-house suspension center. Together these young people became behavior problems and faced school disciplinary action. These problems often occurred when they were given too much unstructured time. Since they were not involved in positive experiences outside of their classrooms, they turned to their negative environment and troublesome friends for support. With their lack of positive support, the young men's aspirations became unrealistic or confused. They continued to believe that they might achieve success, while their dismal school experience preempted it. A football player thought college athletic recruiters would overlook his poor academic record and would provide him with a scholarship. Another young man spoke of becoming a commercial artist, yet he did not respond to his art teacher's advice concerning his art assignments. High school for these young men became a very tedious and upsetting experience, and they continued to look for direction as they struggled each day with the problem. Without direction and without a strong belief in self, they may never be able to determine goals and aspirations, and their experiences will likely dissipate into a life of unfulfilled potential.

Implications

High ability students in urban high schools across the country have educational needs which must be addressed if we are to help them reach their full potential. High school educators in urban settings must deal with the question of how to provide their high ability students with an educational program which will best provide for their needs. The following recommendations were made for the high school involved in this research, and they may be applicable to other urban schools.

- *Reorganize schools to allow for smaller high school student populations.*

In smaller schools, faculty and staff members would be better able to grasp the educational needs of the students and fewer students would be lost in the shuffle. Counselors would have more time to become familiar with the students and to provide them with more appropriate educational programs. In its reorganization, the urban school system should implement magnet schools in the visual and performing arts, sciences, and industrial technology. These alternative programs would provide a stronger match between student learning styles and curriculum.

- *Employ a talent development specialist to facilitate appropriate educational programs for high ability students.*

The talent development specialist could work closely with administrators, teachers, and counselors in planning programs. The specialist would also work with identified high ability underachievers and their teachers in a proactive manner.

- *Conduct staff development sessions focused on the identification of high ability underachievers.*

This training would help counselors and faculty members develop appropriate intervention programs for this population.

- *Provide strong after school extracurricular experiences and athletic programs to nurture the special interests and talents of high ability youth.*

Continuation of programs such as Upward Bound and summer enrichment programs associated with private colleges and state universities should be emphasized and strengthened.

- *Provide inservice for coaches in academic counseling and motivational strategies.*

A system to consistently monitor academic progress of all athletes should be implemented by the athletic department. Such a system would ensure more than basic eligibility for participation in sports. Coaches who have successfully kept athletes on task academically should be encouraged to share their strategies with their colleagues in the athletic department.

- *Abolish study halls and replace them with more productive options.*

This would eliminate many of the discipline problems that result from students being bored in study halls. Other options should include tutorial programs, guest lecture series featuring speakers from the urban community, and enrichment minicourses offered to students on a rotating basis. Additionally, workshops for students to plan for postsecondary education should be offered.

- *Develop closer ties with family counseling centers in the inner-city to assist urban parents in addressing the developmental needs of their adolescent children.*

This study is part of a larger, on-going NRC/GT sponsored study of 30 inner-city students.

Evaluation Utilization Studies

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Calls for the evaluation of programs stem from a strong belief that the evaluation process will generate data useful in the process of program improvement and development. However, evaluation data and reports that are not used serve no purpose whatsoever. Hence, recent studies at the University of Virginia have addressed the issue of evaluation utilization in programs for the gifted. The first study (Hunsaker & Callahan, 1991) examined current trends in evaluation of gifted programs. A review of 70 evaluations collected from school districts across the nation reveal several distinct trends.

- Most gifted program evaluations use summative evaluation.
- Administrators determine the evaluation questions.
- Data primarily reflects opinions about the program and are gathered solely through questionnaires.
- Evaluation designs do not reflect current thinking about what constitutes effective gifted program evaluation.

These trends are at variance with recommended practice for evaluation utilization.

To understand and describe which factors do contribute to evaluation utilization in gifted programs was the purpose of an extension of the descriptive study of Hunsaker and Callahan. First, through a review of the general and gifted education evaluation utilization literature (Tomlinson, Bland, & Moon, 1993) two sets of factors affecting utilization were identified:

- Factors which are not under the evaluator's control (such as economic and political conditions).
- Factors which evaluators can control (such as design, audience identification, dissemination, and quality of evaluation).

Then, through a series of case studies of 12 school districts selected on the basis of complete and thorough evaluation reports, we were able to conclude that an intent to evaluate and a prescribed evaluation procedure result in the use of the findings for positive program change. However, a continuum of differences in utilization exists based upon the extent to which good evaluation practices are used. From these findings, several suggestions follow:

- Make evaluation a part of planning from the earliest stages of program development.
- Develop clear program descriptions and goals.
- Provide adequate funding for evaluations and adequate time for evaluation procedures to be followed.
- Prepare staff for conducting and analyzing the results of the evaluation.
- Clearly identify all audiences that have an interest in or need for evaluation results, and involve them in the full evaluation process.
- Ask questions which are well focused to provide information about the goals, structures, and activities of the program being evaluated–questions which will aid in making significant program improvements.
- Use multiple data sources in order to understand the values and perspectives of varied groups of stakeholders.
- Develop evaluation designs which address complex issues of measurement in programs for the gifted.
- Use a variety of data gathering methods designed to reflect the unique structure and goals of programs for gifted learners.
- In evaluation reports, fully describe procedures for data collection and interpretation so that audiences understand processes which were followed and conclusions which were drawn.
- Disseminate to all appropriate audiences reports which are timely and designed to encourage follow-through in translating findings into action. Develop a specific plan for turning findings into positive program growth as an essential part of each evaluation, including roles which various program personnel, evaluators, and stakeholders will play in that plan.

Also emerging from this study is the need for training of personnel in gifted education program evaluation.

For more complete descriptions of these studies see:

Hunsaker, S. L., & Callahan, C. M. (1991, November). *Trends in the evaluation of gifted programs.* Paper presented at the meeting of the American Evaluation Association, Chicago, IL.

Tomlinson, C., Bland, L., & Moon, T. (1993). Evaluation utilization: A review of the literature with implications for gifted education. *Journal for the Education of the Gifted, 16*(2), 171-189.

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Emotional or Behavioral Disorders: Classroom Conflicts

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Jake

Jake wears his sandy hair short and he is well built and dresses fashionably. Yet, his clothes show the signs of wear around the knees one would expect of an active young boy. Jake is twelve years old and is the youngest in the family of five children. After several years of behavioral problems in school, Jake was diagnosed as Attention Deficit with Hyperactivity Disorder (ADHD) at a state children's hospital. Jake received educational support services from a special education teacher. He was also involved in the gifted education program. The classroom teacher chose to restrict Jake's access to the gifted education program as punishment for inappropriate classroom behavior. Jake has a full scale IQ score of 141.

Ethan

Ethan is a tall, slim thirteen year old seventh grader. His hair is cut short but tends to stick out from his head. He wears glasses and appears to look like the stereotypical gifted student. He enjoys baseball, is active in the Boy Scouts, reads constantly, and is involved with building models from plastic airplanes to Estes rockets that fly 1000 feet high.

Ethan's kindergarten teacher first reported behavioral difficulty in the classroom. This resulted in a psychological assessment that determined no special services were needed at the time. In third grade Ethan was simultaneously recommended for the gifted program and for special education. Subsequently, Ethan was recommended for special education and denied entry to the gifted program due to his hyperactivity. Ethan has been identified as having ADHD by a local physician. He receives special education services while being classified as having a specific learning disability in writing skills. Ethan has a full scale IQ score of 135. He has been prescribed Ritalin and receives two doses each school day.

Gifted Students With Emotional or Behavioral Disorders

Gifted students have often been considered immune to Emotional or Behavioral Disorders (EBD). Unlike Jake, most high ability students who are also classified as having an EBD condition are eliminated in the identification process or disqualified due to classroom behavior or hyperactivity (Baum, Owen, & Dixon, 1991; Davis & Bull, 1988). In the case of Ethan, a second area of exceptionality was identified.

To learn more about twice exceptional individuals, 10 students who have simultaneously demonstrated gifted behaviors and those characteristics associated with EBD as defined by Forness and Knitzer (1990) were sought for participation in a recent study (Neu, 1993). EBD refers to a condition in which behavioral or emotional responses of an individual in school are so different from his/her generally accepted, age-appropriate, ethnic or cultural norms as to result in significant impairment in self-care, social relationships, educational progress, classroom behavior, or work adjustment.

Several students in the study by Neu were identified by professionals as having Attention Deficit with Hyperactivity Disorder (ADHD), or oppositional defiant disorder, and in most cases were also diagnosed with a specific learning disability. Some of these students were also identified as gifted by their local school system, but few actually received the services of a gifted education program.

Methodology

Qualitative methodology, including open-ended interviews, document review, and naturalistic observations of the classroom, guided the research. The researcher spent a minimum of three days in the classroom of each student as well as interviewing the parents, the students, and their teachers.

The Student in His Environment

The students in this study spent seven hours of the day, five days a week in the educational environment. The behaviors of two of the students will be highlighted.

Jake sits in a reserved seat in the front of the class next to the door. While this prevents him from interfering with other students, unfortunately it is very close to the coat rack which provides Jake with several opportunities for distraction.

The classroom teacher sits at the back of the room with her desk facing the blackboard. The student desks are aligned in five rows all facing the board. The board is covered with the day's

assignments. The students work on assignments while other members of the class attend a reading group which is held at a large table located near the windows. Jake appears to be extremely bored.

Ethan

Ethan's time in the special education resource room is shared with four students at the long work table. The student next to Ethan engages him in conversation on occasion, but they are not friends. Ethan sits with his back to the wall and leans his chair back on two legs, until the teacher corrects his position. Ethan spends little time on the class assignment, while the teacher works with other students.

Dead Time

During data analysis, recorded observations were coded for recurring themes. It became apparent that participants in this study experienced a large amount of time in school that was noted for the lack of student engagement. In the classroom observation of these students this phenomena was entitled "dead time." Dead time owes its origin to two sources: the teacher's use of instructional strategies and the high intellectual ability of the students. Because these students were bright, they often completed their work in less time. The material was assigned to all members of the classroom, without consideration for the advanced abilities of some students. The students in this study finished this work before their peers and entered a period of dead time. With dead time, student energy had no outlet in the classroom, and off-task behaviors occurred. The interrelationship of their high abilities, the emotional or behavioral disorder, and their academic environment contributed to excessive dead time.

For Jake dead time usually occurred when the students were called to their reading groups, and Jake and his other classmates should have been engaged in working the math problems on the board. Jake had difficulty starting the task. He talked to his neighbors or shuffled through the pile of papers in his desk until the teacher left the reading group to help Jake begin the math problems. He finished his work much earlier than his peers, and began looking for challenging work

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on his intellectual level to engage his time. Finding nothing stimulating, Jake glanced toward the classroom teacher to check her position. She was busy with the last reading group. Jake then moved toward the teacher's desk. After a few moments, the teacher noticed Jake and told him to return to his desk. Jake did not respond and continued to manipulate an egg timer on the teacher's desk. The teacher called a second time, and Jake gave no response. The teacher called Jake the third time and then started to approach him. Jake then placed the timer behind a stack of books on the teacher's desk. The students filed out of the room to go to music and Jake looked back as he left the room with an unusual smile on his face. The egg timer subsequently went off during the interview with the researcher.

...escalate the level of curricular opportunities; otherwise these students will camouflage their high abilities...

Ethan was also diagnosed with ADHD and dead time typically occurred around inappropriate instructional practice in the resource room. When Ethan was confronted with inappropriate remediation, he displayed the classic manifestations of EBD behaviors which were noticed by his teachers as seen in the following description:

> Ethan received remediation in writing skills for his diagnosed learning disability in the resource room. The 50 minute period consisted of direct instruction of descriptive writing skills. Ethan had a paper clip that kept him amused for 10 minutes. He twisted it out of its original shape and invented new shapes. Ethan cleaned his finger nails with it and then would bend it around his pencil. The paper clip proved to be much more interesting than his assigned task. Ethan finally turned to the required assignment and finished quickly. Ethan occupied himself the last 15 minutes of class by reading an article in *The National Geographic*.

Behaviors Observed

These short scenarios depict emotional or behavioral disordered behaviors commonly used in the identification of ADHD (American Psychological Association, 1987).

- often fidgets with hands or feet or squirms in seat
- has difficulty remaining seated when required to do so
- is easily distracted by extraneous stimuli
- has difficulty following through on instructions from others
- has difficulty sustaining attention in tasks or play activities

At the same time, these students demonstrated above average abilities. Both of these students completed unchallenging work quickly, and in most cases before their peers. They also completed work accurately and, in some cases, Ethan's other teachers even used his worksheets as an answer key to correct his peers' papers.

Conclusion

When Jake and Ethan hit dead time, EBD behaviors drew the teacher's attention. In both cases, the regular classroom instruction was below the intellectual needs of the individual student. Jake and Ethan had difficulty starting their work, yet still finished work before many of their peers. The challenge, then, for educators is to escalate the level of curricular opportunities; otherwise these students will camouflage their high abilities and enter into "dead time."

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The National Research Center on the Gifted and Talented wishes to welcome the following new Collaborative School Districts

Addison Northwest Supervisory Union
Vergennes, VT

Rush-Henrietta Central School District
Henrietta, NY

HyperCard and Image Processing as Vehicles for Gifted/Talented Students

Terry Hoffer
CAI•21
Billings, MT

The use of technology, particularly hypermedia—an electronic text and image processing system in which text and images can be integrated and accessed in either linear or nonlinear projects—is invaluable because it provides a means by which learners may use a variety of intelligences (Gardner, 1986) in their explorations of information and ideas. In 1988 Apple Computer set up its Apple Classrooms of Tomorrow (ACOT) research project to explore learning when students and teachers have immediate access to interactive technologies. To pursue this research focus, ACOT established technology rich classroom sites and encouraged teachers to develop new curriculums and methods of instruction that take advantage of the technology.

The preliminary results of several four-year longitudinal ACOT studies provide evidence that interactive technologies may be a useful tool to solve some of the problems that exist in our current educational system. ACOT teachers report that their students become increasingly more curious and assertive learners when they have technology at their fingertips. The teachers claim that their students are no longer reluctant to take on new challenges; in fact, the students often pioneer selected topics far beyond the given assignment, just for fun (Baker, Gearhart, & Herman, 1990).

So what does all this have to do with gifted and talented education? In a survey of gifted and talented students, Betts (1990) reported that the three main reasons students are dissatisfied with traditional curricula are: classes aren't challenging or interesting, they have no input or control over what they study, and assignments do not allow for creativity. Technology can be a useful vehicle in addressing some of these needs.

The use of technology, particularly hypermedia, is invaluable because it encourages learners to use a variety of intelligences in their explorations of information and ideas. Coupling technology with well-planned activities "turns on" all students to learning, but it especially motivates gifted and talented and at-risk students. Using hypermedia, students can create interactive informational presentations which contain text, images, music, live-action video, live-stills of video, digitized samples of spoken voices, or colorful animations. Thus, many students who had been "turned off" towards school suddenly become excited about their own learning.

As the Instructional Technology and Curriculum consultant for the Northern Lights TeleGeography (NLTG) Project at a middle school in Eastern Montana, I have had the opportunity to observe and work with many students in a high computer access (HCA) environment. Before participating in the NLTG Project most of these students were not motivated or not interested in studying geography. But as they developed computer skills, they became very enthused and excited about their work.

Let me share a typical example with you. A Venezuelan foreign exchange student came to class to share the culture and customs of South America with North American seventh grade students. Among the many topics the exchange student discussed were South American music and dance and their role in the social life of young Venezuelans. Of particular interest to three students in the class was the demonstration of South American dances. These students videotaped a demonstration of South American dances including the mambo, merengue, and lambada so they could use selected footage for a hypermedia project. As they storyboarded their project, they decided that they wanted to include the following elements in their hypermedia presentation:

- maps of various South American countries,
- QuickTime movies of South American dances,
- animated "feet" showing the dance steps involved with the lambada,
- digitized music that went along with South American dance, and
- information about the lambada and South American dances in general.

Before beginning the actual work on their HyperCard stack, the girls decided that they

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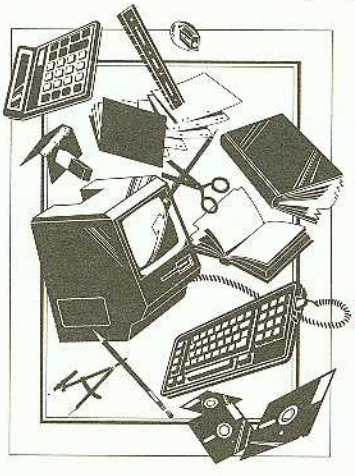
needed to research specific items in these dances such as the steps involved, musical rhythms used, and general information about the dances themselves. As they explored library materials about dance, both girls were able to further crystallize their ideas into the form they wanted to present and thus began to create and design their stack.

Once they had completed their research, they began to produce the QuickTime clips of the dances they wanted, digitizing Latin music, producing the "moving feet" animation, and scanning the maps they wanted to use in their presentation. Three students who had always been late to class, disinterested, and generally problematic students were suddenly engaged. They arrived at school early in the morning to work on their project, came to class with objectives for the day, and worked during noon hour and after school. In observing them, I overheard discussions involving problems in animating the dancing feet and ways they might resolve these problems, what information should be presented as text or images, and information about how Latin dances related to a South American country's overall culture.



It was thrilling to see how excited they had become about studying the customs and culture of South America, but the most interesting behaviors that I observed were the processes these girls used to solve their problems as they put their HyperCard project together. The use of computer and video technologies also gives students a feeling of empowerment. Empowerment refers to an internal state in which students see themselves as responsible for, in control of, or the source of their own learning. In the classroom, student empowerment is dependent upon the allocation of power between teachers and students. When students control few elements in the learning environment, their empowerment is low; when they control many elements, their empowerment is high. ACOT teachers report that in their high computer access classrooms, students are able to learn without being taught (in the traditional sense) by the teacher (Tierney, 1989). Tierney (1989) identified the following three classroom conditions that affect the level of student empowerment: task shaping, task size, and task complexity.

The level of student empowerment was high when learners were able to expand, modify, or in some way "shape" their work activities and completed assignments. As opportunities for task shaping increased, so did the level of student empowerment. For example, when students could determine the topic for a report and the sources they would consult, they were more empowered than when a teacher (or set of directions) specified the topic, the sources, and the other elements of the process. ACOT teachers and students claim that when students have control over their assignments, they are more highly motivated and more successful learners (Fisher, 1989).

When students worked on large assignments such as writing a play or constructing a model, they experienced high levels of empowerment. Conversely, when they undertook short assignments such as workbook exercises and flash card activities, students experienced low levels of empowerment. Indeed, as their tasks increased in size, so did the opportunity for empowerment (Fisher, 1989).

Activities that required problem solving and other higher order cognitive behaviors offered greater opportunity for student empowerment. Instead of doing worksheets, answering questions at the end of the chapter in a textbook, or writing traditional text-based reports, students prepare databases of information, spreadsheets and graphs, hypermedia stacks, real-time movie clips, animated presentations, electronic collages, or telecommunications.

Other activities in the HCA classroom that supported high levels of student empowerment included writing a play, keeping a journal, and working on a student newspaper. In all of these activities students relied heavily on their computers. Activities that offered little student empowerment included taking recall tests, completing practice exercises, and listening to large group instruction.

In discussing the South American dance project with each of the girls who worked on the project, I asked them why they were so excited about their work, and each of them said that they were very interested in dance. But they each added there was more to it than that—the main reason they were so enthused was because they were in charge of what went into the project. They also stated that the really "cool" thing was that they had to figure out

some things for themselves. There was no cookbook recipe for them to follow, and that made the work challenging and exciting. They each told me it was the first time they had felt that way about anything that had happened in their schooling.

Research has shown that when students are provided with means to creatively express their ideas, they are motivated to learn, and they spend more time on projects (Gardner, 1993). Computer graphics and real-time movies give students the tools to experiment with video to produce images that creatively express ideas. The same can be said of working with digitized sound. Using color Macintosh computers, scanners, videocameras, digitizers, and CD-ROM technology allows students to experiment with different ways to express their ideas.

Referring once again to the South American dance project, the girls who worked on the project told me that being able to create something new was much more appealing than merely reproducing something that already existed in a textbook. They were very excited about and proud of the "dancing feet" animation they had created. The girls commented that actually being able to see the feet move in proper sequence was much more meaningful in explaining dance steps than the "dead" still pictures found in a book.

Although the verdict on the effectiveness of using technology to enhance learning experiences is not final, the preliminary evidence indicates that the use of well thought out image processing activities can be effective in certain situations. But we must remember that good activities allow students to be in control of many of the major decisions that need to be made as the activity unfolds. Students in control of much of their educational process will tend to want to be involved in that process.

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Post NCTM Standards: Why Continue to Provide Special Programs for High Ability Math Students?

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In 1989 the National Council of Teachers of Mathematics (NCTM) published *Curriculum and Evaluation Standards for School Mathematics* with the hope of revolutionizing mathematics curriculum for K-12 students. Inherent in the Standards is the consensus that students need to learn more mathematics, learn new kinds of mathematics, and learn mathematics in a different way. The major thrust of the Standards is problem solving. "Problem solving (which includes the ways in which problems are represented, the meanings of the language of mathematics, and the ways in which one conjectures and reasons) must be central to schooling so that students can explore, create, accommodate to changed conditions, and actively create new knowledge over the course of their lives" (NCTM, 1989, p. 4). If one picks up a curriculum guide for a gifted/talented program in mathematics, one is apt to find a similar goal. In fact, it is true that the call for revision in the Standards is a call for the use of many skills we formerly considered the domain of gifted programs: problem solving, reasoning, communicating mathematically, creative thinking, and making connections between math and the real world. Topics formerly seen as enrichment for the gifted, such as probability and statistics, are now included as essential to the basic curriculum.

The Standards emphasize that the content outlined is for all students. "Our expectation is that *all* students must have an opportunity to encounter typical problem situations related to important mathematical topics" (NCTM, 1989, p. 9). Why then do we need to provide programs for high ability students? In defense of the Standards, it is important to note that they clearly state that all students are not alike. "We recognize that students exhibit different talents, abilities, achievements, needs, and interests in relationship to mathematics" (NCTM, 1989, p. 9). In the updated draft of their position paper on the Provisions for Mathematically Talented and Gifted Students, NCTM recommends that all mathematically talented students "have access to appropriate curricula and instruction that contributes to developing positive attitudes, furthering their mathematical interests, and encouraging their continuing participation in the study of mathematics" (NCTM, in preparation). In light of these recommendations, let us examine why and how a program for mathematically talented students should be developed.

First, it is important to look at the characteristics of highly able math students to recognize the types of mathematical experiences they will need. This is not a cut-and-dried procedure, because different students make use of different talents at different times. Keeping this in mind, characteristics these students might exhibit would include fast-learning pace, keen observation skills, curiosity and understanding about quantitative information, analytical reasoning skills, flexibility and reversibility of mental processes, energy and persistence in solving problems, ability to transfer learning to novel situations, ability to visualize patterns and spatial relationships, and a mathematical perception of the world (House, 1987). These students certainly need to explore math as problem solving, reasoning, communication, and connections (the hallmarks of the Standards), but they need much more. They need to be on the cutting edge of mathematical and technological discoveries. We have a responsibility to prepare them to become our future mathematicians and leaders in business and science.

Now, the question is how do we address the needs of these students. There are many ways to escalate the level of advancement in each standard. Depending on the talents of the students, the curriculum can be upgraded in terms of pace, depth, breadth, areas of interest, or level of intellectual dialogue. For the precocious student, acceleration through summer programs, course skipping, early college entrance, and curriculum compacting is appropriate. Julian Stanley has been instrumental in developing the Talent Search as a means of identifying students, ages twelve or older, to participate in such programs and has conducted

extensive research which verifies the success of these programs (Stanley, 1991). Recently this identification procedure has been extended to students in grades three to five (Lupkowski-Shoplik & Assouline, 1993).

It is important to realize that acceleration of gifted students into a program that does not provide the challenges they need is not the answer! Enrichment is a necessary partner to ensure a stimulating math program. In fact, sometimes enrichment alone may be appropriate to develop the particular talents of the student. This does not mean giving students mind benders or logic puzzles after they have finished their math work. It must be much more—focusing on a well-planned, yet flexible and integrated program of instruction.

The depth of the subject matter must be extended with interesting research questions, independent study projects, and simulation activities which include the use of technology. This will encourage students to apply their knowledge to other subject areas and life situations. Mentors and internship programs can further extend this application. The breadth of the curriculum needs to be expanded with introduction to exciting fields such as chaos theory and fractals. Students' interest levels need to be tapped as they become mathematicians, discovering theorems and creating theory. We must dispel the notion that mathematics begins and ends with the Greeks, when, in fact, most of the mathematics known in the world today has been discovered in the last 50 years! (Sheffield, in preparation). Students need to go beyond problem solving to problem posing and finally to creating problems. It is only at this highest level of creation that students will begin to realize their true potential and experience the excitement of mathematical discovery and research. Throughout this process, we need to encourage intellectual dialogue among students of high ability, and be willing, as teachers, to become co-investigators in explorations stimulated by these discussions. Research has shown that this type of interaction invigorates these students and provides the necessary groundwork for mathematical inspiration (Sowell, 1993).

During the middle of a semester, I was asked to team teach a precalculus course already in progress. The teacher's comments to me, when discussing the class, included "using" the boy in the back row as a resource for difficult questions or problems. What an injustice to this young man! In *America 2000: An Education Strategy* (1991), we are given the following imperative: "By the year 2000, U.S. students will be first in the world in science and mathematics achievement." If we are to live up to this commitment, we must continually challenge our mathematically talented students, for it is these students who have the awesome responsibility of shaping the mathematics and science of the future.

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