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In 1905 Albert Einstein wrote a theoretical paper on special relativity based on the idea that the speed of light is constant at 670 million miles per hour in relation to moving objects. Newtonian physics would be completely revolutionized as the result of his new conception of the relationship between space, time (spacetime) and light with objects moving at constant velocity. Then, ten years later in 1915 Einstein published his general theory of relativity which took into account the effects of gravity (curved space) on accelerating objects. Brian Greene, a physicist at Columbia University, has said regarding the profound concepts of relativity theory: "The relativity of space and of time is a startling conclusion. I have known about it for more than twenty-five years, but even so, whenever I quietly sit and think it through, I am amazed. From the well-worn statement that the speed of light is constant, we conclude that *space and time are* in *the eye of the beholder*. Each of us carries our own clock, our own monitor of the passage of time. Each clock is equally precise, yet when we move relative to one another, these clocks do not agree. . . ." (**The Fabric of the Cosmos**, 2004, p. 47). Gifted students and their teachers should study Einstein's work and life throughout this 100th anniversary year. Greene's book is an exemplary resource for studying Newton's laws of motion, Einstein's relativity theory, quantum mechanics, and other fascinating ideas. A book that provides interesting information about Einstein's life and debates with colleagues is, **Einstein Defiant: Genius versus Genius in the Quantum Revolution** (2004) by Edmund Blair Bolles.

Most educators are wary of the primacy of intelligence and ability tests in defining giftedness and identifying gifted children. Satisfactory explanations of how the gifted mind works and how it differs from others have yet to be developed and evaluated through research. **Shulamit Widawsky's article** presents a definition of giftedness based upon how gifted children process information from their environment. She works professionally as a counselor of gifted children, adults, and families as well as writing articles. Her expertise is in working with highly/profoundly and twice exceptional gifted children. She studied psychology at the University of Judaism in Los Angeles, and special education at San Francisco State University. Her website can be found at: www.shulamit.info. **Raja Almukahhal** discusses his methods of teaching physics to gifted students at the secondary level. He is working on a book of challenging problems that Gifted Education Press will publish in the spring of 2005. Dr. Almukahhal has a Ph.D. in theoretical physics from Howard University and teaches physics courses at American University and Marymount University. In addition, he has a mathematics and science tutoring center in Falls Church, Virginia. **Tony Burnett**, our correspondent from New Zealand, has written an excellent article containing recommendations for effectively teaching gifted high school students. His recommendations are based upon teaching science and mathematics courses at the secondary level for twenty years. **Michael Walters** completes this issue with an examination of the giftedness of President Harry S. Truman..

Maurice D. Fisher, Ph.D. Publisher

EXPERIENCE AND PROCESSING: THE FUNNEL AND CYLINDER ANALOGY OF GIFTEDNESS

BY SHULAMIT WIDAWSKY, COUNSELOR ANNANDALE, VIRGINIA

There are differences in the intensity and quantity of experience any individual must process. The Funnel and Cylinder Analogy is a theoretical way to visualize this aspect of giftedness. The "funnel" in this analogy represents the aperture through which experience must pass to enter into a person's being. The "cylinder" represents the age, and therefore the processing ability one has. The size of an individual's funnel dictates the speed at which an experience will create fodder for the processing phase. Therefore, the larger the funnel, the greater the intensity and quantity of experience that must be processed. The smaller the cylinder, the faster it will "overflow" with experience.

Why Analogy?

The definition of *giftedness* has been relegated to the field of education for most of the last 100 years. In this way, the concept has been co-opted as a label for children, to insure they are getting properly educated. As such, the modern concept of giftedness has generally been associated with government mandated educational systems.

Such a definition leaves us to rely on intelligence tests to assess if a child is gifted, while providing no access to the other needs of the gifted.

When we deal with our giftedness, psycho-educational evaluations don't tell us about our emotional states, don't tell us how to parent our gifted children, or deal with our own gifted lives. Analogy can help us understand something that tests can partially assess, but cannot describe in the context of life in general.

The *Funnel and Cylinder Analogy* of giftedness provides for a view of the gifted that brings the *feeling* and *experience* of being a gifted person into context.

People who are gifted do not "grow out of it" in adulthood, but it is true that some of the more salient features of giftedness have a rather more noticeable set of behaviors when they are in a child. So our analogy will begin there.

There are many different kinds of children. The three examples I have created are not to be considered any kind of quintessential archetypes of giftedness. Nor is it the case that they claim to show other ways to assess giftedness in a child. They are merely examples.

Experiencing life differently

"Within the top 1% of the IQ distribution, then, there is at least as much spread of talent as there is in the entire range from the 1st to the 99th percentile." -- Hal Robinson, *The Uncommonly Bright Child* (1981)

Three 8-year-olds are sitting side-by-side, watching a production of "Fiddler on the Roof." None is fidgeting. All are engaged in the show. The first child enjoys the music and the dancing, and understands the basic story line. The second child is deeply aware of the stage lighting and set design choices, is impressed with how the choreography compliments the score, and laughs out loud when a character, who is not important to the scene, reaches his finger through his (empty) glasses rim to scratch his eye. The third child is riveted to the story throughout, and moved to tears when Tevya announces that his daughter is "dead" to him, due to her choosing to marry outside of her faith.

After the show, child one is happy, and ready to go out with the group for ice cream. Child two is willing to go for ice cream, as long as the adults are willing to engage in a conversation about the stagecraft. Child three feels overwhelmed. This child is not ready to go out, nor to socialize. Child three is filled with thoughts and emotions regarding the possibility that choices people make could earn them ostracism from their family, and, as if that weren't enough is also wondering about how families deal with changing times, and how times will change in this lifetime.

The average person takes in, analyzes, and synthesizes experience in proportion to their general age and emotional abilities. The gifted person may take in levels of experience that they are not able to process evenly. They are taking in, analyzing, and synthesizing experiences out of proportion to their general age or to their emotional abilities. This disproportionate system creates what is generally called *asynchronous development*. That means the gifted person is likely to mature faster in some ways, and slower in others. In the area of their gifts, they may be years *ahead* of their peers, while simultaneously lagging years *behind* in other areas, particularly in the emotional realm.

One's emotional age is often not the same as one's physical age. People often do not "act their age" for a variety of reasons. One common reason is the ratio of processed to unprocessed experience with which a person must contend. The first child in the "Fiddler on the Roof" example has processed the show and is ready to move on to the next experience—the child took in no more than was immediately processable. The second child still has processing to do, but is willing to combine the processing with an outing for ice cream—this is the moderately gifted child. The third child is so overwhelmed with experience that the only comfortable alternative is to block off any more for a while. The third child is at capacity, and must process these experiences before allowing in more.

The first child is an easy one. Culturally, this child is normative and fits in well. This is not a gifted child.

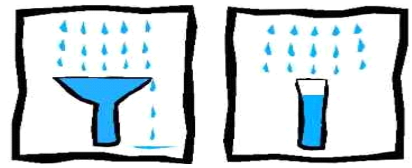
The second child has very specific needs. This child is unlikely to find many age-mates who will be able to hold the kind of conversation this one needs in order to process properly. This is an extroverted child, who is moderately gifted, with particular strength in creative areas. As long as the adults around this child are willing to engage in these conversations, this child will do fine. If the child is shut out…if the adults in this child's life tell the child to "find friends your own age," this child will quickly become unhappy and overwhelmed.

The third child is highly or profoundly gifted. This child consistently takes in more than anyone else around. This child's ability to take in experience and limited ability to keep it out (to say nothing of the child's *internal* experience which also needs processing) is literally one in a million or rarer. This child is also an introvert—very common amongst the highly gifted. This means that even if there *were* an intellectual peer around, this child would need to process internally before sharing. This child is often accused of being unnecessarily sensitive. The internal workings of this child are not shared, and the level of experience of which this child is capable is qualitatively different than virtually everyone. People tend to be mystified by, and eventually angry at this child's behavior, which is commonly viewed as anti-social as well as immature.

While some part of emotional maturity reflects the overall level of experience a person has, a large part of emotional maturity comes from processing that experience. The processing sorts the experience, culling and organizing useful aspects, and releasing dispensable ones in such a way as to not leave excess, unprocessed bits floating around to distract and disrupt the mind. Each person's processing speed and ability are unique to them. When experience is matched to processing capability, development is likely to be consistent: emotional maturity and intellectual ability will develop in sync. When experience exceeds processing speed or ability, development will become uneven, asynchronous. The larger the backlog of unprocessed experience, the slower the emotional growth. Furthermore, for the person with a backlog of unprocessed experience, *new* experience may be perceived as an irritant, or even as an attack, to which the person reacts accordingly.

Funnel and Cylinder

For analogy, imagine each person represented by a cylinder on a base. Its height is representative of the person's age. It is open at the top, and this is where experience falls in, like rain. In the analogy, if the cylinder were used to measure rainfall, it would do so accurately. That is, if the cylinder collected one inch of rain, we would confidently say one inch of rain had fallen. It is a standard cylinder. But what if the top of a cylinder is a funnel? Then the wider the funnel, the faster the cylinder fills with rain. Under otherwise identical conditions of rain, when the standard cylinder is filled to one inch, the cylinder with the wide-mouthed funnel will have filled higher.



After some sunshine, one inch of rain has evaporated from each cylinder. It begins to rain again. The standard cylinder has processed all its rain before the next storm. Not so the funneled cylinder. If the cylinder is too short, or the storms come too close together, the funneled cylinder is more prone to overflowing, even with gentle rain if it continues long enough. In the worst storms, the standard cylinder might also eventually overflow…but the funneled cylinder will overflow much earlier. It's easy to see how the funneled cylinder is "more sensitive" than the standard cylinder, when exposed to the same conditions.

Applying the analogy to the special needs of the gifted

All young children are prone to times when experience exceeds their ability to process, and they become overwhelmed. If a child is 4-years-old, they have had only 4 years to process their experience. The gifted child, however, is more aware, more capable of taking in life experience (and more able to independently create internally produced experience). If a 4-year-old child has as much cognitive, physical, and/or emotional experience as a 6 or 8 year old, that child will tend to be emotionally "immature." That is, no matter how brilliant the child, they will still have more backlog of unprocessed experience than other 4-year-olds, and will become over-stimulated that much more easily.

The gifted child takes in more experience than average. This doesn't make the gifted child necessarily "better" than the "average." To connect the analogy…most folks want a rain gage that measures accurately. They want to set the cylinder out, and not be bothered by irregularities and overflows. Now, if you're looking to collect rain, you'll want the cylinder with the funnel on top—but don't expect it to measure rain accurately, and be prepared for it to fill up and overflow.

To continue with the analogy…

As a person grows older, their ability to take in experience and knowledge grows, but it grows at a rate inconsistent with their age. In this analogy, when referring to the gifted, the size of the "gift" is the size of the funnel. At times a person's "funnel" might be so large compared to their "cylinder" that they are overwhelmed by almost any "rainfall." Think about age 2 or age 14 (most children are at their most sensitive at those times). At other times, their cylinder will grow faster, and be significantly more able to accommodate large storms.

Just because children go through stages where they *can* accommodate more "storms" doesn't mean that is their new base level. Over the course of time, if their abilities to *take in* again outstrips their abilities to *process*, they will again become more "sensitive," more likely to "overflow." There is high correlation between "the size of the funnel" and developmental consistency. Therefore, the more gifted a person is, the more asynchrony they are likely to experience, and the longer they are likely to take before reaching an "adult" level of emotional maturity.

While the "child prodigy" who becomes the 25-year-old CEO might be the popular myth of the highly gifted, in reality we see a high proportion of "late bloomers" amongst the highly gifted. And the young CEOs that do exist, are most often the products of an emotionally supported childhood, combined with at least one very understanding mentor. (Gifted people need mentors!) Perhaps late bloomers are still doing the work of "processing" before they intentionally create a whole new adult arena of experiences.

Recognizing giftedness

If someone is gifted, and their gifts are intellectual or academic in nature, it is reasonably easy to apply standardized tests to see if, and at what level, the person is gifted. Standardized tests, such as the Stanford-Binet, or WISC, etc., have been normed against large populations, and have been shown to have statistical accuracy. They can be tremendously useful. But not all gifted individuals conform to the standard measures. For a variety of reasons, these tests may underestimate or entirely miss the giftedness of an individual. So if a standardized test is not always reliable for assessing giftedness, just what is the definition of giftedness?

It is important to know if you or your child is gifted, even if the word itself seems uncomfortable. As described above, gifted people have special needs. It is painfully common that gifted people, their families, and their teachers are unaware of the unusual emotional needs of the gifted. As in the example at the beginning of this paper, the gifted person who has their needs met will be more fulfilled and more productive in life. More fulfilled because they get the time and resources necessary to process efficiently. More productive because once experience is processed, then the person has time and energy to devote to applying their abilities.

If intelligence tests are not a reliable way to define giftedness, how do we spot it? There are a variety of checklists and descriptions available, but they generally come down to four traits. The "gifted" person is more awash in experience than usual, and this means they are persistently:

a. Receiving more information (large funnel)

b. Encountering more emotional stimulation (filling up with unprocessed experience)

c. Making more connections (creating more experience by their internal workings)

d. Seeing more options (having to apply more emotional energy to deal with the results of all that processed experience)

While all gifted people are taking in and processing more experience than 95% of the population, *what kind of experience* they are prone to be taking in may or may not be applicable to academics, or only to one area of academics. An artist's "funnel" might take in visual experience: color, placement, pattern, movement, etc. An athlete's "funnel" might take in physical experience: direction, pressure, speed, body position, etc. A mathematician's "funnel" might take in pattern experience: number patterns, visual patterns, musical patterns, etc. A writer's "funnel" might take in human or natural experience: personal interactions, natural beauty, quirks, style, etc. The artist, the athlete, the mathematician, and the writer may all be gifted, or even profoundly gifted, and yet their "composite" scores on a standard intelligence test may underestimate or even miss their giftedness.

Even as a small child, the athlete may be constantly overwhelmed with physical stimulation and experience. Any touch that isn't readily categorized may be experienced as dangerous. This child will take years before realizing that few people possess this heightened sensitivity to the physical senses. Without proper direction and self-understanding, this child is unlikely to fit in well with peers, or to feel comfortable being so different than everyone else.

Implications

What are the implications to the future of serving the needs of the gifted, given the concepts described in this paper? Clearly, gifted education as it stands is not reaching all the gifted children, and even when it does, the process is not recognizing the rest of the unique needs of the gifted beyond keeping them intellectually "challenged." The present attempts at defining and serving *giftedness* keep the concept relegated to the education of young people. In this way, we do a disservice to gifted children, families, and adults.

Research into the ways introverted and extroverted gifted people become overwhelmed, and what happens when they do, would go a long way towards helping us better serve both gifted children and adults, and toward helping those gifted people learn to understand themselves better in the context of how they differ from others, not just based on their IQ scores, but due to something intrinsic in their nature. How can we come to recognize the needs expressed in this paper, if we cannot assess giftedness by any means but the reproducible intellectual exam? When we can better describe and assess giftedness as it affects the entire person, not just the classroom, we will provide a great benefit to those who have extreme potential to give back to society many-fold what they are given. The long term investment into such research and resources is worthy and sound.

Related Materials:

Axline, Virginia M. (1964) **Dibs In Search of Self**. New York: Ballantine Books.

Kranowitz, Carol Stock (1998). **The Out-of-Sync Child: Recognizing and Coping with Sensory Integration Dysfunction**. New York: The Berkley Publishing Group.

Kurcinka, Mary Sheedy (1998). **Raising Your Spirited Child: a guide for parents whose child is *more* intense, sensitive, perceptive, persistent, energetic**. New York: Harper Perennial.

Robinson, H. B. (1981). **The Uncommonly Bright Child**. In M. Lewis & L. A. Rosenblum (Eds.), **The Uncommon Child**. New York: Plenum Press.

Tolan, Stephanie S. (1996) **Beginning Brilliance.** Chapter 11 in Joan Smutny (Ed.), **The Young Gifted Child: Potential and Promise**. Cresskill, NJ: Hampton Press, Inc..

Webb, James T. (1994) **Guiding the Gifted Child: A Practical Source for Parents and Teachers**. Scottsdale, AZ: Gifted Psychology Press.

TEACHING PHYSICS TO GIFTED STUDENTS BY RAJA ALMUKAHHAL, DIRECTOR MATH & SCIENCE LEARNING CENTER (MSLC) FALLS CHURCH, VIRGINIA

Physics is a difficult subject for most students and they express the shortcomings of past Physics courses in the following ways:

• Course work is too fast-paced. The instructor moves too fast through the material without ensuring student comprehension of the concepts. Instructors either assume students understand the material or cover too much in very little time without stopping and making sure that the majority of the class grasps the work.

• Too much theory, not enough application. The instructor concentrates too much on the theory and derivation of formulas. Little time is spent explaining how to use formulas in solving problems.

• The textbook is too big, wordy, and difficult. Instead of clarifying, the text confuses. It is just too technical for their level of understanding and the examples presented are not good enough to assist with the homework problems at hand.

• Students are intimidated by the math. The amount of mathematical calculations for the individual problems often intimidates students. Many students are led to believe that even though they had satisfied the mathematics requirements for the course, they are still unable to go through all calculations and get the correct answers.

• Poor presentation. Many students say that past physics courses were boring. "I hate physics" is a quote heard very often.

These are most of the complaints that I hear from students who have taken a college or a high school physics course. I think that their complaints are well founded and sincere. Physics is indeed a tough subject to swallow and the instructor needs to develop a methodology on how to teach a physics course. I will briefly explain the methods that I use in teaching my general physics courses.

Objectives and Methodologies

The main objective of any General Physics course (regardless of its level, calculus- or algebra- based, or conceptual) is to teach students the basic concepts of Mechanics, Heat, Electricity, Magnetism and Optics for at least two semesters. These basic concepts are fundamentally simple to understand. Experience has taught me that each concept (say, the conservation of momentum) can be explained in few minutes. After all, that's the essence of Nature; it is just too comprehensible, to use the words of Albert Einstein. However, the difficulty of physics does not lie in understanding the basic concepts but rather in formulating these concepts in a mathematical language and then utilizing this language (the formulas) in working out physics problems. Therefore, the main objective of the physics teacher is to teach students how to transform a physics problem into mathematical symbols and diagrams, and then use the laws of physics to transform those symbols into *equations of motion* to obtain what is being asked by the problem. I believe if this objective is met, most of the problems cited above can be minimized.

Since the concepts of physics are simple and can be easily explained, I spend approximately 70% of the class time in having students develop skills on how to use the basic concepts of physics to solve problems. While solving a problem for them, I explain every step of the solution and tell why and how to think about each step. For example, in the case of Conservation of Momentum, which is a collision problem, I tell them to try to visualize the two balls colliding with each other, and have them "run a film" in their minds and see how the collision takes place. This type of visualization helps them see, for example, the direction of the momentum vectors and thus where to place the minus signs. Please refer to the Examples section of this article to read three basic examples on how I use this teaching method to solve problems.

Other times, the whole class participates in working out a problem on the board. I ask one student to come to the board and have the class discuss how the problem can be solved, while I am seated and watching their performance and asking questions. This procedure has proven to be a very powerful technique in helping them develop problem solving skills. Other times, I pose a problem on the board and have each student discuss the solution with his or her immediate neighbor. I usually give them 5 to 10 minutes to discuss a solution strategy, while I am walking around between the students, listening to their discussions, interjecting and making comments. Sometimes, and if my schedule is flexible, I conduct an extra hour or two as a recitation class that is totally devoted to solving "good" problems. This extra time is usually outside my normal teaching load.

In addition, I try to bring physics closer to their daily lives. For example, how does an airplane fly? (Archimedes Principle) Why is the average height of Humans about 5'5"? (Acceleration due to gravity) How does the car engine operate? (Basic laws of Thermodynamics) What is a Black Hole and how does it form? (It can be easily explained in the classical frame of Newtonian physics) and so on. This makes physics more interesting for them.

In regard to the mathematical difficulty of the course, I usually leave one side of the chalkboard (especially, if there is a chalkboard on the sidewalls) for the mathematics topic that is immediately needed. I call this side of the board the "aside," pertaining to "aside from the main topic" that is being discussed at the time. I go on covering the necessary algebra/calculus (say, the quadratic formula, a trigonometric identity or the integration of an exponential function) or a physics expression from an earlier chapter and then come back to the topic at hand. Most of my students find this procedure to be very helpful.

Furthermore, it is fundamental that the teacher must develop a good relationship with students. Being nice and pleasant goes a long way as well as developing a caring attitude. Words of encouragement and praise are very helpful. Also, words of concern about the performance of an individual student can help him or her study better. I constantly look for feedback from students as to their status in the course. I believe that I have a naturally good rapport with students. Here is a sample list of comments I frequently make:

"Sarah, you are doing poorly on the homework, how come you don't show up during my office hours? Any problems?"

"John, your performance has been steadily declining, what is going on?"

"What can I do to help you study better?"

"Do you have a problem following my lectures?"

"Do I go too fast?"

"How do you study for the exams?"

"How much time do you spend on your homework?"

"Brad, your attention seems to wander while you're in class. Can you please, next time, sit up front so I can see you?"

"Abdul, I can see that you are doing better. Thanks, please keep it up."

"Terry, you are one of my best students in class; I just wanted to tell you that. Thanks."

Every time I finish a lecture, I speak to the entire class, "I hope you all enjoyed the lecture as much as I did." Immediately after I return a graded exam or homework: "If you have any comments or criticisms about the way I graded your exam/homework, please do not hesitate to approach me."

On the first day of classes: "I would like to mention that I do encourage all of you to come to my office and talk to me about anything that concerns the course. I am open to any suggestions or concerns and you can always feel free to discuss how I grade your homework or exams."

The above phrases work very well with me. The key words are *personal communication* with the students.

Examples

The main purpose of the examples is to show the science instructor the teaching methods that I use in my physics and astronomy classes that I have taught at different colleges and universities. These methods have proven to be extremely effective in teaching students the basic skills and concepts of physics and astronomy. Currently, I am in the final stages of authoring a book on physical science for gifted students, "Physics & Astronomy Exercises for the Gifted." The book will be published by Gifted Education Press and will be on the market sometime before this coming summer. If you need to learn more about its content, please see the Conclusion section.

The following examples are brief extracts from the book.

General Science Example

The Scientific Method: Rapid Estimating

Objective:

Students in this exercise, will gain skills in approximating values for a specific quantity.

Theory:

Most problems in science require precise numerical answers. For example, we need to know exactly what size to cut a crystal of quartz to set the correct pulse for a digital watch, or we need to know exactly what angle and at what speed to fire a projectile to hit a certain target. However, often times, scientists depend on initial rough estimates to tell them about certain effects before they go to the trouble of making exact calculations. Other times, scientists use rough estimates to decide which techniques or which theories to use if they are faced with different ways of calculating a measurement. Rough estimates are important for measuring quantities that may take too much time to obtain or may require too much data that is either unavailable or too difficult to acquire. For example, if you are looking at a photograph of a lake and would like to know how much water it contains, how would you calculate this amount? Another example, let's say that you want to know the thickness of this page that you are reading, and you do not have a precise measuring instrument such as a micrometer. How would you measure it? Learning the technique of rough estimation, or more commonly known as **the order of magnitude estimate** can be very helpful because it could save the scientist a lot of time, energy and sometimes, money. In this exercise, you will learn, by several worked-out examples, the basic techniques of estimation. This can usually be done by making reasonable assumptions about what you are trying to measure and then rounding off all your calculations to one significant figure, an order of magnitude.

Problems (with hints):

Problem # 1:

Estimate the thickness of this page.

Hints:

As we mentioned earlier, an ideal way of measuring the thickness of this page is to use a micrometer. But let's say that you do not have such a fancy instrument at your disposal. So how would you measure it? First, we make use of the concept of *symmetry* in physics: We make the assumption that all pages in this book are identical; have the same thickness. We can then use a simple ruler to measure the thickness of, say, 50 pages (remember that 50 pages counted back and front means 25 different sheets of paper.) What must be the average thickness of each page? You need to repeat this process several times (3-4 times) for different number of pages. A typical ruler has a *least count* of 1 mm, so make sure that the chosen thickness of pages should not be less than 1 mm. After you obtain several values for the thickness of one sheet, get the average thickness from all of them.

Problem # 2:

If you decide to walk from Washington, D.C. to Los Angeles, how long do you think it would take you? (in hours and days)

Hints:

To solve this problem, we again need to make some assumptions. Since the day is 24 hours, we will assume that you need 8 hours of sleep every day. In addition, we assume that you will need to eat three meals a day and rest for a while during each meal. This means that you need to stop walking three times and each time, let's say for 45 minutes. That sums up to a total of 2.25 hours per day. So the total time of sleep, meal and rest is 8 + 2.25 = 10.25 hours per day. Now we need to calculate your average walking speed. It takes about 20 minutes to walk a mile (if you disagree, try it yourself.) That converts into 3 miles per hour. Now we know your walking time per day and your average walking speed. What else do we need to know? So how many days would it take you to walk from DC to LA?

Problem # 3:

Here is a more difficult one. This problem was posed by the world-famous physicist Enrico Fermi in the 1940's: Estimate the number of piano tuners living in San Francisco (he actually said New York City but we will use San Francisco instead.)

Complete solution:

In order to solve this problem, we need to make some intelligent guesses. First, we have to ask the question, what is the percentage of people who have a piano in their homes? One way to find out is to ask all your classmates how many of them have a piano in their homes. Then obtain the ratio of the number of students who have a piano in their homes to the total number of students in class. Let us guess that 1 piano per 3 families have a piano in their home. This would correspond to 1 piano per 12 persons, if we assume that the average family size is 4 persons. If we assume the population of San Francisco is about 800,000 people, then there are about 70,000 pianos. Now we know that a piano needs to be tuned about twice each year, or every 6 months. We also know that a piano tuner, who works an 8-hour daily shift needs about 2 hours to tune a piano. That means that he/she can tune 4 pianos a day, 5 days a week, 50 weeks a year. Thus he/she can tune about 1000 pianos per year. Therefore, San Francisco with its 70,000 pianos needs about 70 piano tuners.

Problems (without hints):

Problem #4:

Approximately what is the number of raindrops that fall on 1-acre of land during a 1-inch rainfall? (1 acre = $4 \times 10^4 ft^2$)

Problem # 5:

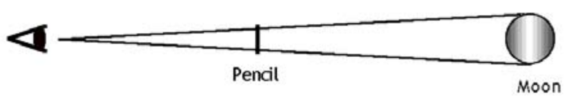
If the average diameter of an atom is 10^{-10}, estimate the number of atoms in 1 - cm^3 of solid?

Problem # 6:

How many books can you shelve in a university library if the total floor area is 5500 ft^2 ?

Problem # 7:

Figure is not drawn to scale



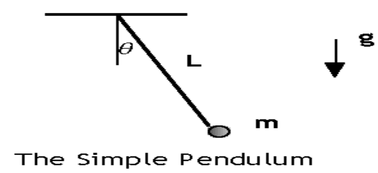
Hold a pencil in front of one eye (while keeping the other eye closed) at a position where it barely blocks out the Moon. If you know that the distance from Earth to the Moon is about 3.8×10^5 km, make appropriate measurements to calculate the diameter of the Moon. Compare your result with the accepted value.

<u>Physics Example</u>

The Simple Pendulum and the Value of g

Objective: Students will study the basic characteristics of the simple pendulum and what parameters determine its period, the time it takes to complete one oscillation. Then use the motion of the pendulum to determine the numerical value of the acceleration due to gravity, g.

Theory: The simple pendulum (see figure below) consists of a mass (a bob) that is attached to a string that is fastened so that the assembly can swing in a plane. Some of the physical parameters of the pendulum are (1) the mass of the bob, (2) the length of the string and (3) the angular displacement of the swing. Those parameters play a role in determining the period of the pendulum. The first part of this experiment is to investigate the effects of the above three parameters, mass, length and angle, and see how they affect the period of the pendulum. The second part of the experiment is to determine the acceleration due to gravity, g. This can be done by substituting experimental data in the theoretical expression for the period.



The theoretical expression for the period of the pendulum is:

$$T = 2\pi\sqrt{\frac{L}{g}}$$

Where T is the period, L is the length of the pendulum. Keep in mind that this is a first-order approximation for the period of the pendulum. That is, it is good only for small angular displacements, θ #20E.

Procedure:

After setting up a simple pendulum, you need to experimentally investigate the dependence of the period on the mass of the bob, length of the pendulum and the angular displacement. In each case, you need to briefly describe how each parameter affects the period.

Remarks:

Rather than timing only one oscillation, it is better to time several oscillations (4 or 5 oscillations) and determine the average period (why?). In addition, it is better to start timing after you put the pendulum into oscillations for one or two swings to make sure that the oscillations are steady. If not, stop the pendulum and start again. Also, when measuring the length of the pendulum it must be measured from the pivot (fulcrum) point to the center of the bob.

<u>Astronomy Example</u>

Parallax and Absolute Magnitude

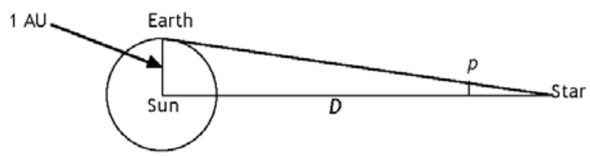
Objective: In this experiment, the student will study the concept of parallax and will demonstrate how the distance and apparent magnitude are related to the absolute magnitude of the star.

Theory: Astronomers measure the distances to the nearer stars by measuring a small angle called the parallax. **Parallax** (p) is expressed in seconds of arc (arcsec), and the reciprocal of the parallax is the distance (D) to the star in **parsec**, i.e.,

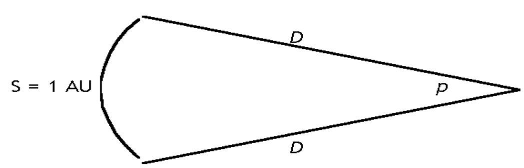
$$p = \frac{1}{D\,(\text{parsec})}$$

Trigonometric Parallax:

As the figure shows below, the parallax of a star is the angle p, expressed in seconds of arc, subtended by 1 AU at the star's distance.



With the exception of the sun, parallaxes of all stars are less than 1 second (1") of arc (why?) For all practical purposes, the triangle shown can be replaced with a thin sector of a circle (as shown in the figure below) in which p is the central angle of the sector and the 1 AU distance is the arc of the circle of radius D.



You may recall from geometry that if we divide the arc length, S, by the radius we get the angle of the sector in radians. That is, since $S = D \times p$, then $p = \frac{S}{D}$. For our case,

$$p = \frac{1AU}{D}.$$

To convert degrees to radians we multiply degrees by π/180E. It follows that:

$$1'' = \frac{1^\circ}{36000} = \frac{1}{3600} \times \frac{\pi}{180} = \frac{1}{206{,}265}\ \text{radian}$$

We define a parsec as the distance to an object whose parallax is 1" of arc. From the above equation 1" = 206,265 radian and since parallax is the reciprocal of distance hence 1 parsec = 206,265 AU

Problem:

If 1 year is 3.156 x 10^7 seconds, 1 AU is 9.3 x 10^7 miles, and the speed of light is 186,000 mi/sec, express 1 pc in light years.

1 pc = _________________________ light years

Parallax and Distance:

Since distance is inversely proportional to parallax,

$$p = \frac{1}{D\,(\text{parsec})}$$

this means that doubling the distance will reduce the parallax to half its value. For example, if the parallax of a star is 0.05", then its distance is 1/0.05" = 20 pc. Now, if another star has half the value, 0.025", then its distance is 1/0.025" = 40 pc.

Problems:

1) A star is at a distance of 250 pc. Its parallax is:

______________________.

2) The nearest star has a parallax of 0.76".

(a) Its distance in parsec is:

__________________________________.

(b) Its distance in light years is

_______________________________.

Absolute Magnitude:

The absolute magnitude of a star is the apparent magnitude that star would have if it were at a standard distance of 10 parsecs. So when the distance D is specified to be 10pc, the apparent magnitude m is equal to the absolute magnitude M.

Conclusion

I am in the final stages of writing a book on physical science for gifted students, "Physics & Astronomy Exercises for the Gifted." The book will be published by Gifted Education Press and will be on the market sometime before this coming summer. I have included extracts below from the Preface to illustrate its content and objectives. If you have any suggestions or questions, please do not hesitate to contact me.

Preface: *Physics & Astronomy Exercises for the Gifted*

The principal objective of this book is to expose the student to the scientific method through working on real-life scientific experiments that have actually been solved by master scientists in the past. Most of these problems require only the use the mathematical methods that the student has already acquired from previous math courses, such as algebra and trigonometry.

The main topics of these problems are in the fields of physics and astronomy. However, it is not necessary that the student has taken such courses, nor it is necessary that he/she is taking a current physics or astronomy course. The book can be used as either a supplement for a current physics or physical science course, or it can stand on its own as an advanced physical science course for middle school students. Every experiment or exercise begins with an objective. Then an explanation of a phenomenon is presented along with the relevant theoretical framework that is related to it. A detailed procedure is explained and several relevant examples are solved to help the student: (1) develop the necessary computational skills; and (2) build up intuition about how the solution to a problem should occur.

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(MORE) OBSERVATIONS FROM THE SHARP END: RECOMMENDATIONS FOR TEACHING GIFTED STUDENTS IN HIGH SCHOOL

BY TONY BURNETT

HIGH SCHOOL TEACHER OF THE GIFTED NORTH CANTERBURY, NEW ZEALAND

In the last issue of ***GEPQ*** I mentioned that I would outline a method of teaching gifted children that I have seen operating successfully in a standard, state-funded High School here in New Zealand. Well, here is a quick summary of its main points and an assessment of how successful it was.

The trouble with Schools, as everyone knows, is that they've always been places where bad habits are easier to pick up than good ones. Think of the new "vocabulary" children acquire after their first five minutes there. When they return home, proudly, on that first afternoon the conversation usually runs something like this.

Mum: "Hello darling. How was your first day at school?"

Billy: "It was really fun. Our teacher is Miss Lockett and she's neat.

Mum: "That's nice dear, and what did you learn today?

Billy: "Lots and lots of things. Mary Koster wears pink knickers and I learnt some new words too, @#$% and *$%#. Mum……Mummy? Dad! Come quickly. Mummy's fallen over……"

Well, if that brings back a few memories I'm sure you don't have them on your own……and High Schools are usually no better than their Elementary counterparts. We all know what the problems are of course. They range from contact with inadequate teachers—those with poor classroom control and poor curriculum knowledge—through to boredom, bad company, truancy, verbal putdowns, harassment, bullying, the drug culture and so on. It's quite a list, isn't it? If it sounds a bit like daily life at your local High School then perhaps the answer is to look for a better school, and many parents do exactly that, but doing so usually involves a greater or lesser degree of extra expense and may not solve the problem anyway. The trouble is that choice of school does not give choice of teacher and even the "best" schools have a staff widely divergent in ability. A few teachers are truly excellent and often provide a "whole of life" inspiration to their lucky pupils but others are equally incompetent and there's no way of telling who will step in front of which class until that holy of holies, the Timetable, is completed at the beginning of the year. In other words, from parent and pupil point of view it simply comes down to chance. Even in the most expensive schools the child, gifted or not, is forced to take a lucky dip out of the overall teaching pool. There's another factor too, and that's the manner in which the classes are actually put together……something usually decided by the school's particular philosophy. I don't know of the situation in the United States but New Zealand is drowning in a sea of political correctness at the moment and the current philosophy of "those who must be obeyed" is *mixed ability* classes. Believe it or not, the rationale runs something like this: *"Classes shall be of mixed ability because that arrangement more easily allows the demonstration of teamwork. In this day and age I'm sure I don't need to remind you of the importance of working as a team. Mixed classes provide occasion for higher ability pupils, who may already be conversant with the work, to assist the weaker ones who need a greater degree of consolidation……*" and so it goes on. Yeah, right. I'm sure the fine print, somewhere, must say something about flying pigs too! My own practice provides no support for such waffle. Still, these days it seems that you can dress any crackpot theory with the mantle of "modern educational practice"if you try hard enough and make the language sound suitably impressive. My experience, for what it's worth, is quite different. In mixed ability classes the brighter pupils are usually bored silly, the struggling ones usually do as little as possible, and any gifted pupils who might be present are usually ignored altogether.

Anyway, the best and most successful system of class organization that I've ever come into contact with had four main features. Classes were *block-timetabled,* they were *streamed,* they were *differentially weighted in size,* and they were *taught in parallel*. Let's look at each of those in turn.

The school concerned was one of three High Schools operating in a small provincial centre of around 15,000 people. It maintained a total pupil population of approximately 620 and could expect an intake of around 140 new pupils each year. In other words, for the compulsory subjects of English, Math and Science the school needed to cater for *six* standard sized first-year classes. Now, by "block-timetabled" I mean that three classes at each year group in each particular subject were scheduled to operate at the same time. That's all. Not rocket science is it? If it seems an obvious thing to do then I'd like to assure readers that it is not common practice here. The usual thing is for schools to divide their total pupil intake into randomly chosen, equally sized classes and schedule them separately. The common argument against block-timetabling in schools is "*The difficulty in organising it*" but for the case I am describing here, if any difficulty did in fact exist, then it was overcome very easily. Sometimes it's hard to escape the feeling that objections are often raised simply because a proposal actually *is* different. Schools here are very conservative institutions. Plenty of lip service is paid to the idea of "*innovative teaching methods*" but that's all it usually is, lip service. Let a teacher be bold enough to try a truly innovative idea and he/she is soon reminded of the normal practice. Quickly too. It's strange, but the reminders seem to come with a speed in direct proportion to the idea's success……so much so that it's sometimes difficult not to think that anything other than professional jealousy is at the core of it. Anyway, the block timetabling was initially attempted with the first year math and science classes. The 140 new pupils were divided into two groups, with all care taken to ensure that the division was as evenly balanced as possible. And what does that mean? Well, IQ testing was arranged for everybody on the first day and the pupils were subsequently placed in descending order from highest score to lowest. From the consequent ranking they were then divided left-right, left-right, working down the list until there were two columns, each containing a similar range of IQ scores. The 70 pupils in each column were then split into three classes based on their (supposed) ability. It was these three classes that were timetabled to run at the same time. As I said earlier, there were six math classes so while three were scheduled for math, the other three were scheduled for science and vice-versa.

Now let's look at the differential weighting. The pupils in each column were divided into an *accelerate* class of **35**, a *standard* class of **25,** and a *remedial* class of **10**. Each class had quite different goals and methods.

The members of the *accelerate* classes were subject to high expectations. They were taught in an unconventional way with high levels of teacher input and little reliance on any particular textbook. They were provided with significant areas of enrichment beyond the specified syllabus and they were prepared, in a shorter time frame than usual, for the formal exams usually undertaken only in the senior years.

The *standard* classes were taught in the conventional way. They used the usual resources specified for that year and progressed through the school according to the normal time frame.

The *remedial* classes were taught only basic math operations and equal emphasis was placed on establishing patterns of behaviour helpful for working life beyond the classroom. By that I mean punctuality, appearance, personal hygiene, good manners and so on. Several members of these classes came from disadvantaged home backgrounds and were more in need of sound advice from an adult friend and mentor than for any degree of high-powered instruction. The teacher for this group was appointed more for his/her qualities as a role model than for any mathematical expertise. The requirements were for personal qualities of patience, sympathy, tolerance, integrity, good sense, and so on.

One of the problems of variable teacher quality in smaller schools is that parents soon know who the best teachers are and often move heaven and earth to ensure that their child is placed in their classes. It's an understandable reaction but something fiercely resisted by Principals……and for good reason too. Chaos would soon result if pupils could elect to attend classes depending on who was to teach them. Still, the difference a good teacher makes can be truly remarkable and parents know it. It's easy to sympathise with parents, and that brings me to what I earlier called "teaching in parallel." To avoid parental comparisons between teachers, the same teacher was appointed to teach *both* classes at each level. In other words, whoever was appointed to teach the accelerate stream taught them both, a second teacher taught both standard classes, and a third taught both remedial classes. The advantages are obvious I think. The system ensured that both classes at each level were taught the same material at the same time and in the same way.

Right, that's how the system was designed. So how did it actually work in practice? Well, it's fair to say it was a great success and eventually made a real difference to the attitude prevailing in the whole school. Nevertheless, I suppose you could say it was something of an "iceberg" system. What showed above the surface was thought out pretty well but the real power lay out of sight, tied up in a few features I haven't yet mentioned.

The first was the way in which the teachers themselves were selected. When planning a teaching program for their staff most schools aim to achieve "balance." By that they mean a mix of classes……junior/senior, large size/small size, advanced/remedial and so on. For reasons that have never been clear to me, school authorities seem to think that a stated preference for teaching any one age or ability grouping is nothing more than a public admission of weakness. *"Good teachers should be able to teach all levels and all abilities"* is something I've heard many times. Well, perhaps they should, and I'm sure they can, but to me it seems akin to telling Michael Schumacher that in order to really prove his driving skill he needs to reduce his appearances in Formula 1 and compete in cross-country motor-cycling as well. It's just as silly, anyway. Why shouldn't a teacher with a flair for a particular age and/or ability grouping not be placed there? To me it's just a simple case of allocating resources in the most appropriate way. Anyway, in the system under discussion preference counted for everything. The teachers involved taught only the stream they felt most comfortable with and had previously stated a preference for. Thirty-five teenagers are quite a handful in a single class but they were the brightest pupils in the school and very little (if any) of the teacher's energy was ever bled away in handling discipline matters. It was hard work, but positive and rewarding work too. The remedial class had only ten, but they were also the pupils who required a greater level of individual assistance. There was no shortage of teachers who preferred a small remedial class to a large advanced one. It was "horses for courses" as they say. In fact, thanks to an enlightened Principal, vacancies on the school staff were advertised and filled to fit the system, not the other way around.

The second thing was the resultant improvement in the overall discipline in the school. Two "top" classes of 35 each meant that half the total intake was accelerated, a number not justified, of course, by their individual IQ scores. The ideal would have been to run *four* classes in each band with numbers 10, 25, 25 and 10, but staffing restrictions did not allow it. It's true that too many were placed in the accelerate classes but to avoid a charge that the system was "elitist"—unfairly favouring the bright while the slower pupils were neglected—there was little option available. Imagine the fuss if the classes had been organized 10, 30, 30, as, to cater properly for the gifted pupils, perhaps they should have been. Anyway, the saving grace was that there was no coercion. Every pupil was in the class that he or she preferred. Since three classes were operating simultaneously, moving pupils from one to another was simplicity itself. But even if they found the pace of work to be difficult, no pupil who was trying hard and who *wished to remain* in the accelerate class was ever removed from it. Quite the reverse in fact. Any pupil working hard in the remedial or standard classes and keen to transfer to the next level was encouraged to do so. On the other hand, anyone who was unwilling to make an effort and/or was rude or disruptive was "moved out" immediately. It is surprising what a difference that made. Most teachers are only too aware of the problems and the time wasting that can be caused by a few undisciplined pupils. Very often their acts of bravado are no more than a means of gaining attention—and raising their profile amongst their peers perhaps—but that is beside the point. Disruption is still disruption, no matter how it is rationalized. Ahh……but put such pupils together in a small class where they can try to impress *each other* and see what happens. Of course, using the possibilities inherent in block timetabling as a disciplinary measure was not something that was shouted from the rooftops. As I said before, political correctness rules. Nowadays if a pupil breaks a window he or she is more likely to be patted on the head and commended for his/her restraint in not wrecking the entire school than to suffer from being disciplined in any way. Well, the ability to isolate troublemakers may not have been advertised but it certainly was used. It was effective too. Keeping the standard and accelerate classes free from disruptive pupils did as much as any other single feature to ensure the success of the whole system.

Well, it might seem that the system did little to cater for gifted pupils but, as I mentioned earlier, the teaching methods in the accelerate classes were unorthodox. For instance, no textbooks were used during class time. Pupils had access to a variety of texts, which they were welcome to borrow as they liked of course, but classroom time was spent entirely on teacher/class interaction. In addition, as great an emphasis was placed on variety, discussion and fun as was put on subject instruction. The brightest pupils initiated discussion on many topics, especially on physics, but *nothing* was discouraged or forbidden. Literature, poetry, and current world affairs were also popular. The whole thing worked with such positive results that the scheme was soon extended to cover the second year as well.

Once the system was up and running the word soon began to spread and the High School started to take enquiries from parents on behalf of highly gifted children still in Elementary School. The first "unusual" enrollment was an 8 year old boy who walked along each day to attend the accelerate maths class. There were several other bright young people too, so perhaps this is a good time to describe the examination structure that we have here. The first formal exam is taken at the end of the *third* High School year, usually around age 15/16. It is not difficult. Assuming a pass, the remaining two years are spent in preparation for possible attendance at Polytechnic or University. There is a second external exam, called University Bursary, which is taken at the end of the *fifth* (final) year. Few pupils attempt University courses without a good pass at Bursary level although it is quite possible to do so, especially in the arts. I mention this because the accelerate pupils were given the opportunity to sit the first exam in their *second* year. Again, there was no compulsion and pupils were entirely free to make their own choice. Many chose to sit the exam earlier than usual because they knew that success would give them more time to prepare for University in their senior years. It was with exactly this in mind that the young lad attended. He passed easily, aged 9, and went on to pass his Bursary exam when aged 11. (He now has a Ph.D. in Computing and is working for Microsoft in Seattle.) That first enrollment was quickly followed by several others and I know of at least three other boys and two girls who were equally successful at a similar age. Since then all have gone on to Doctorate level in Mathematics, Physics or Astronomy.

That's a quick summary of an unusual but successful system. If I were asked to choose one factor that, in my opinion, over-rode all others it would be the importance of keeping gifted children as much as possible in company with their like minded peers. Age is not important, but attitude is. The accelerate pupils were encouraged to question everything. There was no fear of "looking silly" by asking a "dumb" question and no-one was ever laughed at, or made fun of, or made to feel small for giving a wrong answer. As I said, the key features were *variety* and *fun*. The academic side was not ignored but it wasn't over-emphasized either. Pupils did very well academically because they were bright, they enjoyed their work, they were constantly encouraged to "aim high," and they quickly developed good habits of self-discipline. Some University courses here have restricted entry, mainly due to the limited numbers that can be accommodated in training. Medicine and Veterinary Science are two cases in point, and it's not easy to win a place in either of them. A teacher who had been continually at the school for more than fifteen years—prior to the advent of the accelerate system, that is—was unable to remember a single pupil ever going off to Med School or Vet School. I'm pleased to say that the new organization soon changed that.

Problems? Yes, there were a few of course. There was never a shortage of suitable candidates willing to teach the remedial and standard streams but staffing the top classes was more difficult. The accelerate classes demanded a high level of teacher energy and a high level of personal intelligence too. A wide general knowledge was no handicap either. Gifted pupils deserve a gifted teacher and there are not that many around. Did someone mention homework? The standard classes usually were given a little homework to do each night but the accelerate classes didn't work like that. They were asked to nominate a day (Tuesday say) and were given a prepared sheet of homework questions on that same day each week. They then had a week to get it done. Given out on Tuesday, handed in the following Tuesday with *no excuses*……unless they were sick and away for the whole week of course. Doing it that way gave the pupils practice in organizing their own time and doing their own research. It also gave them plenty of opportunity to ask for help if they felt they needed it. In a single stroke it voided the age-old excuses that are always trotted out for the failure to do nightly homework. Things like, *"I forgot. I didn't know how to do it. I didn't take my book home. I had to babysit for the neighbours. I did it but lost it on my way to school. I did it but the baby ate it. I was hit by lightning. I was abducted by aliens."* Etc. etc. This method taught them self-discipline and they soon got to grips with it. Homework in on Tuesday, say, next assignment sheet out on that same Tuesday. It was a good system. Many pupils developed a real pride in their assignments and turned in excellent work but, once again, it demanded a lot from the teacher. Marking seventy weekly assignments on top of work with other classes took a lot of time. But these were the best young people we had, so it needed to be done properly or not be done at all. A real effort was also made to return the marked work on the following day—so the class could review it while it was still fresh in their minds of course—but that put extra pressure on the teacher too. Some teachers professed themselves ready and able to teach the accelerate classes……but only under their own specific conditions. In other words, they would do it if they could allow the pupils to "self-mark" their own homework assignments, or, they would do it if they could issue textbooks and work through them rather than have such constant input themselves. I sympathized, but declined their offers. As far as I was concerned it was either the "whole package" or nothing. As I said, finding teachers capable enough and energetic enough to handle enthusiastic young people with IQs up to 150+ was not an easy exercise. Many were called, as the saying goes, but few were chosen……and that was the main difficulty.

THE BUCK STOPS HERE: TRIBUTE TO ONE OF OUR MOST GIFTED PRESIDENTS, HARRY S. TRUMAN (1884-1972)

BY MICHAEL E. WALTERS

CENTER FOR THE STUDY OF THE HUMANITIES IN THE SCHOOLS

" 'I always had my nose stuck in a book,' he said, 'a history book mostly. Of course, the main reason you read a book is to get a better insight into the people you're talking to. There were about three thousand books in the library downtown, and I guess I read them all, including the encyclopedias. I'm embarrassed to say that I remembered what I read, too.' " (President Harry S. Truman, quoted in **Plain Speaking: An Oral Biography of Harry Truman** by Merle Miller (1974).

All of the presidents of the United States from Franklin Delano Roosevelt to George W. Bush, Jr. had a more extensive formal education than Harry S. Truman. Yet he was the best read. He had the attribute which is one of the most important of a gifted individual -- an autodidact. His education was stimulated exclusively by his sensibility, and he believed that the lessons of the past were a living narrative for contemporary issues. This is due to Truman's perception that the past and present are part of a continuum of the human condition. During the presidential election of 1948 he campaigned against the "do nothing Congress." He made a comparison between his political opposition and the Roman politician, Cato, who was known as The Sensor because he opposed innovative ideas. This political tactic led to Truman's presidential victory in 1948. Throughout his political life, Truman based his decisions upon his erudite reading of history. Besides history, Truman read in the broad range of the Humanities which included biography, philosophy, political science, military strategies and sociology. He grew up in a rural Missouri city called Independence, a product of middle America or the American Heartland. The Independence, Missouri school system had a more rigorous curriculum than most contemporary schools of higher education. Among his courses and interests were the classics of Greek and Latin writers and thinkers. One of his high school classmates was Charlie Ross, a famous journalist who eventually became Truman's press secretary. Despite his lack of higher education, all of his former teachers were not shocked to see Truman become president of the United States.

Two of Harry Truman's famous statements were "the buck stops here," and "if you can't stand the heat, stay out of the kitchen." They illustrate his approach to making political decisions. As president, he made many important decisions that affected world history. The major one was to use the Atomic Bomb to end the Second World War. Another one was that he integrated the armed services. Several military officials threatened to resign, and Truman told them that he expected their letters of resignation the next morning. However, none of them resigned. He decided to take a third course in the Cold War -- the route of containment which was neither direct confrontation with the Soviet Union nor appeasement. Containment was a measured response to Soviet provocations. When the Soviet Union blockaded West Berlin, Truman organized the successful Berlin Airlift, a turning point in the Cold War. During the Korean War, when General MacArthur sought to unilaterally invade Communist China, Truman (as Commander-in-Chief) demanded and received his resignation. At first MacArthur was hailed as a national hero. But Truman was vindicated after a Congressional hearing into this matter. He has become such an exemplar of courageous leadership that the present consensus of historians and politicians is that he was one of our greatest presidents.

Merle Miller, a television journalist, did a series of interviews with Harry S. Truman in the early 1960s but this television project never materialized. However, the interviews were eventually written in book form as an oral biography. Gifted individuals and teachers will benefit from reading this oral biography by learning how Truman's gifted sensibility was transformed into a major political thinker and force. This book has recently been reissued by a subsidiary of Barnes & Noble: **Plain Speaking: An Oral Biography of Harry Truman** by Merle Miller (1974, reissued by Tess Press in 2004). | | | | | |

ANNOUNCEMENT –

The University of Virginia is hosting two institutes featuring **Dr. Carol Tomlinson.** The **2005 Best Practices Institute** on March 17th-19th will focus on Differentiation and Reading. The **10th Annual Summer Institute on Academic Diversity** on July 18th-22nd and July 25th-29th will explore the topic, "Dealing Effectively with Academic Diversity in Heterogeneous Classrooms." Both institutes offer graduate credit. See the following Website for further information: http://curry.edschool.virginia.edu/go/iad