Working with the Scientifically/Creatively Gifted in Research

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Scientifically, creatively gifted students certainly need recognition, but they also need to be nurtured. Though many experts have attempted to list the characteristics and then outline behavior modifications for them, most have failed.

Once you feel a student is a cut above the others, it is important to build confidence in him or her. The scientifically/creatively gifted are a different lot; they may be egotistical on one hand and terribly afraid on the other. The gifted do not view the world in the same manner as the remainder of the population, and although they have no time for trivia, they may sometimes be trivial in their societal interactions. The gifted are not necessarily better; they are simply more capable.

After the scientifically/creatively gifted have been identified, push them. Challenge them, and develop in them a healthy fear of mediocrity. These students must be encouraged to learn and assimilate, yet also not be afraid to use different approaches to reach their goals. Try to understand that they have the minds but not necessarily the drive or discipline, and that is the problem. Someone must help them become comfortable with challenge, and develop a higher degree of self-motivation. The scientifically/creatively gifted must not be allowed to see the world only from their viewpoint, but be able to productively communicate to others in a gentle manner, realizing not everyone has the same capabilities.

How does one identify the scientifically/creatively gifted? This type of student may assume several guises, ranging from that of a discipline problem to that of a quietly inattentive student. He may also be a high achiever or seem to be an underachiever. According to Brandwein (1975), these students possess high scholastic ability, predisposing factors such as persistence and questioning, and an activating factor provided by the teacher (2). This latter factor is one which needs much more emphasis today. Giftedness represents only potential; it must be encouraged by a nourishing social and intellectual climate (Barnes, 1974, Casserly, 1979) (1,3).

Encouragement

Too often the gifted are either ignored in the classroom because they don't need help, or they are embarrassed with overattention, thus drawing disdain from classmates. Working independently on research, however, provides opportunity for these students to develop a more involved student-teacher relationship which is better suited to particular needs and talents.

Encouragement is the first step. Amazingly, many of these students lack confidence in their own abilities. They do not view the world as others, and often this leads to putdowns or more subtle negative reactions from teachers, parents, and even friends. "Why can't you be like everyone else?" is a question not foreign to them, and it is this attitude which often inhibits creativity. Chasteen (1981) points out that the gifted have learned how to stifle their imaginative output, yet how can anything new be discovered if we demand in return only what has been already taught (4)?

Teaching is not just giving information; teaching is asking questions. If the gifted are not encouraged at a young age, they will often lack the necessary drive, persistence, and skills when they are later able to work with intellectual equals (Vernon, 1977; Khatena, 1978) (9,10).

Young women are particularly adept at only living up to societal expectations and no more, say some writers (Kaminski, 1982; Kahle and Lakes, 1983) (7,8). The gifted need friends and mentors to provide support, encouragement and opportunities of various kinds (Casserly, 1979; Kahle, 1983) (3,6). Again, scientific research allows each student to explore a world where there are challenges to be understood and met.

Organization

Once scientifically/creatively gifted students have been identifiifed and motivated, guide them along. Note the key word here is guide, not lead. **Educare**, the Latin verb from which the word educate is derived, means to draw out. An educator must be prepared to do this with each particular student and also handle any possibly idiosyncratic behavior. The gifted tend to pour out great ideas, then hesitate to organize or follow through with them. Research plans are needed, for not that many have both the curiosity and the manner or discipline with which to challenge their ultimate goals. This is where the educator's role is extremely important. Stress that creative thinking must be organized before it can eventually lead to any attempted proof.

Curriculum

Students of science tend to avoid those areas of the curriculum which seem boring and a seeming waste of time, or at least assumably unassociated with their goals. Yet good scientists are required to report findings in acceptable mathematical and English terms. In addition, students must also develop good communication skills, for scientists indeed have an obligation to tell their fellow citizens about the various aspects of scientific problems. Part of their gift of knowledge carries with it the burden of nurturing greater understanding of these problems in others.

Scientific research should be shown to encompass history, as in the history of previous work. English, as in oral and written communication, should be mastered. Mathematics used in documentation is also an area for necessary competence. After all, science is, according to Gowan and Demos (1964) (5), "a systematic study of natural phenomena by rationally planned experimentation and rational analysis of the results." It is the most powerful method known for gaining knowledge about the world in which we live.

Influence

Realize that teachers exert a great deal of influence; be supportive and encouraging. Remember that enthusiasm is contagious. When asked to isolate those qualities apparent in successful teachers, students have often listed demonstrating kindness, sensitivity and intelligence, making each student feel significant, and most of all, caring.

Educators must realize the needs of the gifted concerning achievement and recognition, and demand neither too much nor too little from their charges. After all, students are not superhuman, and neither are teachers. Don't expect to know all the answers to their questions. Peter Beidler, Professor of the Year, states, "I don't have to be an expert in something to teach it. I say, 'What do I want to learn?' and I bring my students along with me." In the teaching of Zen the highest compliment given a teacher is the surpassing of his knowledge by his students. If all we give our students is what we have and never encourage them to go beyond that, we are not truly effec-

tive. That extended knowledge in each of our students should be the ultimate goal for any challenging teacher of the scientifically or creatively gifted.

Challenge young people's minds and talents. Good grades and even praise are not enough to overcome boredom in the creative science student. Strive towards arousing curiosity and exciting imagination. Respond to the efforts of the gifted and stimulate their interests, even if they are not your own.

Hold up firm and high standards of achievement and behavior. The gifted still need standards imposed upon them so they can develop habits which are necessary for successfully continuing education. Don't confuse inhibiting creativity with the proper channeling of energies.

Dedication

Teachers should be prepared to give always more. They may be called upon to assume the role of resource person, counselor, friend, or even surrogate parent. Extra time is considered a matter of fact; scientific research and/or student questions can never be placed on a time schedule. Be available not only when the need arises, but also be prepared to take the initiative when you feel a need should arise.

The rewards of working with the scientifically/creatively gifted are great. It is gratifying to watch young people analyze a scientific problem, use their own abilities to solve that problem, and emerge with a viable solution. Also, it is good to remember that by educating and encouraging our students, we are quite possibly also educating and encouraging future colleagues.

Gifted students are often the most difficult people with whom an educator deals, but they are a definite, enjoyable challenge.

Summary

Science thrives on knowledge and motivated intelligence. Don't let those valuable assets become anything less than what they can be. Identify the scientifically/creatively gifted and encourage them. Provide an unstifling environment and help them respond not only to the challenges others give them, but more importantly to those challenges which arise within themselves. Students need strong role models to assist in organization and sustentation, but most of all they need someone to care about them as individuals. The growing pains of young scientists and their mentors are very real, but if the challenges are great, the rewards are even greater. Our participation in the education of tomorrow's scientists may be demanding, but the demands which come with excellence are always worth our effort!

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