

Defining What Characterizes a Great School for the Gifted

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My colleague, publisher and friend, Dr. Maurice Fisher, challenged me to write this article. So I shall not disappoint him, for he has influenced greatly my thoughts about educating the gifted student. We have spent hours of time on the phone and via email discussing this topic; and over the years, my books and articles have touched in depth on the materials you shall read within. In light of what I have written over the last 10 years, and discussed with colleagues, I believe five basic principles should underpin a great school for the gifted. G&T students should:

- 1) Engage often in team-based problem solving activities;
- 2) Experience a fully integrated curriculum (STEAM based);
- 3) Bathe in oral and written skills practice;
- 4) Understand the relevance of academic subject matter and intellectual processes to the outside world; and,
- 5) Be facile with math – using it to solve problems and express their thoughts.

Team-Based Activities

This is how the work-a-day world operates; employees work in teams. Students do this in colleges as well. It is the fundamental unit of employee activity today. The days of the lone wolf employee are gone. Problem solving in the light of global competitiveness has become more interdisciplinary and multidimensional, necessitating involving more intellectual horsepower and different viewpoints brought to bear. It makes sense to prepare G&T students as early as possible for the world of work, thus involving them in team-based problem solving.

Team-based activities produce learning dividends for gifted pupils on several important levels:

- Learning about the “give and take” of idea generation and compromise;
- Patience and respect in listening to other ideas;
- Working with people who have different views of life;
- Learning essential concepts of leadership;
- Organizing and planning projects and activities;
- Asking tough questions and framing the problem at hand; and,
- Marshalling viewpoints that support good arguments for your ideas.

Often, gifted students have told me how team-based activities changed their outlook, and their opinions of classmates. Several times I heard gifted middle-schoolers say they made new friends; and discovered how very creative their fellow classmates were – something they never would have guessed. They made new friends because of this activity.

Team-based experiences are the best way to deal with unstructured problem solving – pretty much all the problem solving challenges one will encounter on-the-job. Simply solving the problem is not the only objective; but rather solving the problem with a robust solution is what should be the primary goal. This is something I have advocated before, using a 360-degree problem solving paradigm, where the impact of the solution on the various aspects of our culture are addressed and taken into account in a mediated solution like a matrix analysis. In a variety of articles and books, I champion addressing these concerns, i.e., what engineers do when they design within constraints. How does our team's solution impact the following areas for those who will benefit and use the proposed solutions of the problem?

- Economy
- Society
- Technology
- Environment
- Safety
- Legality
- Regulatory
- ...etc.

Crucial to all this will be how well G&T students learn how to ask questions and can benefit from the next section....the integrated curriculum.

Fully Integrated Curriculum

This is the fundamental enabler for empowering G&T students. This characteristic is a show-stopper for getting the most out of young minds, and qualifying as a great school for the gifted. I was liberated in 1965 (junior year of high school) by my inspirational science teacher (and later life-long mentor and friend), who empowered me to think and act across subject areas....forever altering my academic life, and problem-solving process. This incredible man was teaching STEM/STEAM almost 50 years ago.

Unless our gifted students can appreciate how topical subject matter, both hard and soft, relates to each other, they will be at a severe disadvantage to formulate and address the questions they must ask of their problems. Further, the really interesting questions arise where subject matter interfaces – questions that could be typically asked, such as:

- How should we use technology to extend life; even of the aged and chronically ill?
- Should nano-technology be regulated and why?
- Replace fossil fuel use with solar and alternate energy types?
- Allow the ramped-up use of nuclear power?

In light of the list of constraints I presented in the previous section, can you see how the entire spectrum of technical and humanities topics should be used to evaluate such postulations? And there will be tons of tough questions like this for gifted students when they are adults. I could argue that we have problems in various sectors of society today, because decades ago we failed to robustly pursue comprehensive question-asking, or ignored futuristic projections as to where the solutions back then might lead. This is a problem I might add that transcends all political and economic systems.

Shouldn't we strive to integrate the curriculum so that we inspire our gifted students to more comprehensively solve important problems? We need to do this not only at the school level, but seek to do it at the collegiate level where young teachers are preparing for a career in the classroom. It does not matter whether we call such educational paradigms STEM, STEAM, cross-content teaching or school-to-work.

Before my inspirational teacher passed, our last deep discussion concluded with him telling me, "The schools can only change when we are brave enough to change the way we teach teachers." The modern concept of school derived from the atomized world of the factory production line started about 130+ years ago, where people performed only one aspect of a product's manufacture. By the

1980s, the work world had transformed itself so that everyone's job was concerned with the entire product's integrity and quality. Why not make gifted schools to transition to an integrated education?

Oral and Written Skills

One of my favorite quotes is:

The principle goal of education in the schools should be creating men and women who are capable of doing new things, not simply repeating what other generations have done.

- Jean Piaget

To be able to sell new ideas and do wonderful new things is wholly dependent upon articulating and presenting them for people to evaluate their worth. Oral and written communication skills are absolutely essential in accomplishing this. I cannot think of two more eternally relevant skills to support education.

Whenever I visit schools from middle grades through college, students ask me to divulge the most important courses I took – usually so they can take them too. My answer has not varied in more than 40 years.....writing and speaking, because they taught me how to communicate with people; labs because they taught me how to work with people; and, the humanities because it taught me about the impact of history, the arts and technology upon people. You can imagine the groans I get with this triad of courses – especially among would-be engineers; but it is so important and relevant to a high tech, globally competitive society.

Throughout my four decades of engineering, I can honestly say I never witnessed an engineering career of a peer ruined by technical incompetence, but I have seen quite a few aborted because of poor communication skills. If someone is going to go before the senior management of one's company to ask for money for a project or to propose a new project, the most one can expect is 5-10 minutes of senior management time.....that's it. One must be articulate and able to obtain millions of dollars of funding quickly and efficiently. Also consider this. Many times the senior leaders may not even know you; and will likely form lasting opinions of you from this first encounter. You bet oral and written communications are important!

Prepare your G&T students for what awaits them. Bathe them in opportunities to write and speak. This is like playing an instrument – practice, practice, practice. Here are some suggestions for you to consider applying:

- Grade all term papers and special reports in every subject twice – once for technical content and once for grammar (then stand back and await the howls of protest!);
- Have students keep diaries or notebooks of their work – especially when they are working on team-based projects or inventions;
- Speculative writing for fun is to be encouraged because it can also build creativity in students in venues like science fiction, humorous tales, fantasy and perhaps drama (try poetry as well!);
- If your school likes to host plays and such, get the students involved, or have them write and produce their own plays, skits, etc.;
- Hold contests for the best super short story – say 250-500 words;
- Students can write letters to companies asking for information or to discuss something of importance that company is engaged in;
- Why not have students interview their parents or relatives about important events in their lives?;
- Here is a sobering thought....Have each G&T student write their obituary and picture themselves in the future, and what they may be remembered for; and,

-Mock trials and debating are a superb way to practice these important skills.

Any time students can practice oral and written skills is worthwhile. Even ask your gifted students to suggest other ways to do this. Make it fun, because in the long-term view it is. In the grown up world, those who cannot interact well with others will lead a constricted life. Suffuse G&T education with oral and written communication skills.

Relevance

No lesson sticks like one that is relevant to the outside world. Why do we have to study this?...the lamentations all you G&T teachers have heard countless times before. Well, here is a challenge to you to show how that subject matter is used in the grown-up world. Dig deep and find connections that will make your students understand and appreciate the relevance of what they are studying.

In the STEM/STEAM world, students understand what engineering is, not necessarily as a career, but as a problem solving process – a discipline that can be used to get at the root of a problem and develop solutions. This paradigm can be used in many different types of problem solving situations. It is supremely relevant.

Do not discount the advantage you have here, with access to parents of students who have interesting careers, outside experts you can invite into the classroom, and school alumni who may want to give back by interacting and mentoring students. Champion special assignments to explore what skills it takes to pursue certain jobs and careers. Tie this into career days at school. Maybe host a career fair where many professionals can display what they do and answer questions about important skills to have when looking for a job. What does a resume tell a prospective employer about the applicant? Take your case to your school PTA and get some volunteers. Write or email parents and alumni.....get the message out for folks to visit the school.

Take the class on interesting trips say backstage at a theater to see what makes those plays so cool and how special effects work. Where does your water supply come from? Visit the water department in town and discuss how water engineers do their job every day as well as the skills they need. Invite panels of experts into your school to discuss how people transitioned from school to work, and what skills turned out to be most valuable. Mix up panels to include folks who are architects, writers, politicians, musicians, etc. Explore how they may have common areas of relevance in what they learned in school.

There are endless opportunities for your G&T students to see the connections between school and the world of work. Study the lives of famous people and what they have said about the relevance of school to their career or profession. Plenty of great information exists out there....for you and your gifted students to dig out and profit by.

Math Proficiency

I speak not of math aptitude, SAT scores or the like. I am interested in actually using math to solve problems; nothing of the “given this-find that” philosophy that still permeates math departments. Instead, how can students use math to solve problems in unstructured applications or challenges? Usually, if a student is turned off to math by 4th or 5th grade, he may likely be lost to the subject forever; and that will close many doors to high-paying STEM/STEAM jobs. Math proficiency and relevance need to be as rigorously pursued, as intensively as I suggested for oral and written communications skills.

Sadly, two of the fun places where math was explored and applied in schools years ago have been virtually eliminated – wood shop and home economics.....ruthlessly rounded up and eliminated as though they were academic pariahs to the beloved path to college which so many schools are proud to acknowledge as their reason for being. Truth be told, math is very visible and applied in the trades by carpenters, plumbers, builders as well as cooks, dress designers, and consumer advisors. Of course it is also visible in technical, medical and health services professionals.

I think we need to introduce and use simple math as much as possible in early grades, and solve all sorts of problems with it; and continue to do this in many of the non-technical subjects as well. Simple representations of histograms, pie charts, bar graphs and such to enhance discussion of historical and geography lessons would be helpful. Visual display or representation of population samples, statistics, and information about the school and students can keep math fresh in G&T minds. You can always invite math professionals into the school to discuss how math is used in business and industry.

Explore how math and music are related: Aren't notes really a fraction.....time intervals to hold a note or sound? Maybe if you love the beat of a song, you will also like the math representation within the song; and there is the timing or speed of a song as well....say $\frac{3}{4}$ versus $\frac{2}{4}$ time. Math is all over the place in music like string vibrations and frequencies. G&T students should warm to this math-music duality, as many of the gifted students I have encountered play instruments. Here is an arts connection if I ever saw one. What about dance and keeping time that is consistent with the music and math that accompanies it?

Painters use all sorts of geometry principles to correctly proportion their visual representations. Computer generated art is suffused with mathematical computer coding, as are special effects like morphing. The math is often hidden, but it is there. Develop ways for your G&T charges to access it. There is math application in every topical subject. Find it and bring it to light!

Summing Up

Go beyond the traditional classroom and bring in relevant examples of how what you do inside your red brick building is applicable in the world of work – for that is where your students are headed – whether they go to college or not. Steve Jobs, Steve Wozniak, and Bill Gates never went to or finished college, but they sure as hell applied math, used oral and written communications skills, and solved problems in an interdisciplinary and multidimensional manner. That is the key to their successes. Take the time and effort to use your oral and written communication skills to convince your district about what a great school for the gifted ought to be teaching, and those critical thinking processes that should be inculcated. This article sees the challenge from my viewpoint and experience. How do you and your colleagues' see the challenge? What in your minds would constitute a great school for gifted and talented students? Perhaps there ought to be some conferences on this.

Selected Books by Harry T. Roman from Gifted Education Press

Invention, Innovation and Creative Thinking in the Gifted Classroom: Activities & Design Challenges for Students in Middle & High School (ISBN 0-910609-65-9). 2014.

STEM to STEAM Education for Gifted Students Using Specific Communication Arts Lessons with Nanotechnology, Solar, Biomass, Robotics, & Other STEM Topics (ISBN 0-910609-63-2), Co-authored with R. E. Myers. 2013.

STEAM Education for Gifted Students! Upper Elementary Through Secondary Levels. Combining Communication and Language Arts with Science, Technology, Engineering and Mathematics (ISBN 0-910609-62-4). 2013.

STEM Robotics in the Gifted Classroom: Meet ROBO-MAN! Upper Elementary through Secondary Levels (ISBN 0-910609-61-6). 2012.

STEM—Science, Technology, Engineering and Mathematics Education for Gifted Students: Designing a Powerful Approach to Real-World Problem Solving for Gifted Students in Middle and High School Grades (ISBN 0-910609-60-8). 2011.

Exploring Energy & Alternative Energy Technologies and Issues: Resource Guide for the Gifted Middle and High School Classroom (ISBN 0-910609-37-3). 2010.

Energizing Your Gifted Students' Creative Thinking & Imagination: Using Design Principles, Team Activities, and Invention Strategies: A Complete Lesson Guide for Upper Elementary and Middle School Levels (ISBN 0-910609-57-8). 2009.

Solar Power, Fuel Cells, Wind Power and Other Important Environmental Studies for Upper Elementary and Middle School Gifted Students and Their Teachers: A Technology, Problem-Solving and Invention Guide (ISBN 0-910609-54-3). 2008.