

Teach STEM Right – Change the Academic Day!

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I just finished a new book on STEM for Gifted Education Press, a book wherein I challenge the conventional school architecture, and propose that teachers look to radically changing the pizza-pie model of the academic day.

I have visited many school district web sites, probably thousands of them, usually to find schools that might be interested in the subject of STEM. The various ways STEM is sold by these districts is part of the reason why STEM might not be as popular as it could be. My conclusion after all this is STEM is completely misunderstood by most schools; and how they teach it usually dictated by where they can fit it in. Think about this quote...

“STEM is not just a part of the curriculum for the gifted. It is the curriculum! Maurice Fisher, Publisher Gifted Education Press

STEM is the curriculum – which means everything should be built around it. It is not the usual minimum sum game where you add STEM and minimize the losses to other parts of the academic day. Translation: Change the academic day – 140 years of the same eight subject classes a day is enough already! Let me show you what I found from visiting all these school websites: Many schools and districts create a STEM program by adding some AP courses, or robotics/engineering activities to the existing curriculum, or assign a STEM teacher contact.

1. Some really cheat and add some computer stuff, including keyboarding; and maybe do some robotics design.
2. Project Lead the Way (PLTW) is another repository for a STEM-style curriculum in many schools.
3. Some schools insist that if the arts and humanities are not linked in with STEM teaching, then it isn't STEM at all.
4. Still others throw the whole STEM idea into their vo-tech courses or lump it in with technology education.
5. The big spenders try and create magnet schools around STEM and add pseudo, pre-college work.
6. A variety of schools don't teach STEM until they can get a nice grant for it from an educational agency or a company.
7. And then there are the schools that don't even mention STEM.

So why don't we change the academic day to recognize this and really integrate the curriculum? I suspect there are some powerful reasons it does not happen: -Huge inertia involving textbook companies and what they produce. -Habit, habit, habit. -Boards of Education are reticent to change because of political pressure. -How do you really change the curriculum? -How does one measure STEM understanding with statistical certainty? -How does one educate/prepare the next crop of teachers? It takes time. -Would teachers really want to team teach in a STEM setting? -It's all about test scores and colleges. And I'm sure these are probably not all the reasons.

I have a different perspective. I worked in the business world for 36-years and interacted with students and teachers, bringing real-world, problem-solving (STEM-like) activities into the classroom long before the STEM acronym was coined. I taught collegiate graduate school in the evenings, and taught throughout my corporate career inside a Fortune 500 Company. You might say I champion education not for its academic standards, statistics, and traditions, but rather for what it should be able to prepare students for after graduation.

Students will be hired on their perceived ability to solve problems whether your collar is blue or white. It is a thinking employee's world. This is the coin of the realm after school. Solve problems well and the future is yours. Use all the things you have learned and use them in an integrated fashion to solve problems and you will never be unemployed. Process **and** content reign supreme. So why not use STEM and its process and content theme to get students prepared for the world after school? Why not take the time to measure how well students can think and solve problems? Will it kill the education system to develop metrics for process? Is it “like totally” beyond our capabilities to do this?

Critical Employee Skills – Leveraging STEM

The business world is a multi-dimensional environment that expects its workers to solve problems cooperatively through inter-disciplinary, team-based project activities – assessing, evaluating, and making tradeoffs as necessary. Rigorous adherence to a STEM problem solving regimen is a superb training ground for the mastery of critical employee skills. Here are the critical skills globally competitive employers will look for:

1) Analyze Information

In an information-rich company, people with good planning, organization and analysis skills will be in key positions to manage, process and interpret the huge flow of internal and external data and information.

2) Convert Information Into Knowledge

All innovative companies strive to convert raw data and corporate-gathered information into saleable products and services.

3) Sell New Ideas to Management

The ability to implement new ideas and concepts is the real measure of success. To bring ideas to fruition, one must be proficient in selling ideas to the executive who can grant access to the necessary corporate resources.

4) Communicate Concepts Clearly and Succinctly

This skill is a 'biggie.' Careers have been – and continue to be – severely jeopardized because of poor communication skills. In fact, without them, one's career could be permanently stunted. Employees *must* be articulate.

5) Plan For Timely Commercialization

Getting new products to market is the way companies sustain their cash flow and generate new sources of it. Timely implementation begins with people who know how to plan, organize and execute the commercialization process.

6) Be a Team Player

Team work and collaboration among corporate departments has become a mainstay of industry problem solving. Team members must possess excellent communication skills, present new ideas effectively, and act together to address corporate problems and needs.

7) Do Multi-Dimensional, Integrated Problem Solving

Making sound business decisions require more than just the technical and economic aspects of a problem. The environmental, safety, social, political, and regulatory considerations of a new product are also important

8) Seek Learning Opportunities

Learning must be constant. Continually improving or rejuvenating one's skills to meet new corporate challenges is absolutely essential. Employees must develop and maintain a life-long discipline of learning, honing skills, building new knowledge, and setting new goals.

The challenge to teachers and school systems will be to emphasize and practice these skills during the normal educational process in the classroom. How can these skills and their practice be embedded in the various subjects, classroom projects, design challenges, and team activities that students normally do?

The New Academic Day – Some Ideas for Implementation

Why not consider a studio experience every day for all students where they immediately apply their lessons learned – even if they do not fully understand all of the lessons? This is not harmful, but immensely helpful as it will inculcate within them a healthy expression for application. Humans do this all the time, and they have done so for many centuries. Ancient engineers did not understand the laws of physics and such before they built the pyramids, buildings like the Parthenon, great sailing vessels, gothic cathedrals, and the famed Roman roads and water delivery systems.

So how about restructuring the academic day? Have some recitation style classes in the morning, and where students work in team-based studios in the afternoon.work on open-ended design challenges, using multi-disciplinary thinking, and multi-faceted problem solving paradigms. This would give them half-a-day, every day, integrating their curriculum. Morning recitation teachers would be involved as mentors and team teachers in the afternoon activities.

For grades 1-5, teachers would still teach distinct subject matter as they do now. Team-based design challenges would be conducted every month or so to start the studio inculcation process. For grades 6-12, the full-blown morning recitation and afternoon studio format is implemented. For grades 6-12, it might look like this with subject matter clusters that expand on the commonalities between the subjects being discussed: -Monday: Science, Math, Music, Art -Tuesday: History, Geography, Sociology -Wednesday: Language Arts, Writing, Public Speaking -Thursday: Invention, Technology, and the Economy -Friday: Elective Courses in Music, Art, Creativity, Entrepreneurship, Writing.

Art has been taught in studio format “forever,” and art should be integrated into design challenges too. Budding artists should be team members, bringing their ability to visualize into play, especially where teams are designing new products. **History** oriented and **Language Arts** students are also valuable team members for they can provide historical expression, and the ability to communicate one's ideas and conceptions in both written and oral form. With the growing popularity of **Massive Open On-line Courses** (MOOCs), why can't students engage these resources as regular educational activities – learning at home and having those lessons refined via Socratic teaching methods by their teachers?

Think of the huge human resources available through business and professionals that could be brought to bear in local schools. This practical problem solving experience would be a giant help in the afternoon studio activities. Can you see a place for working mentors and retired people in your school?