STEM-Centric Career Development:

Building Bright Futures from Main Street to Outer Space

By Rich Feller

Intentional efforts to help career specialists understand, evaluate, and promote STEM courses, programs or career options are vital to bridging Main Street's employment challenges with opportunities in the frontier of science, technology, engineering and math.

With Main Street facing an "abundance of labor, poverty of talent, and economic pain everywhere" (Gordon, 2009,p.35), advocating for science, technology, engineering and math (STEM) initiatives and embracing a STEM-Centric career development orientation is imperative to the building of bright futures. Career development specialists' beliefs are driven by a need to advocate for social justice and educational access, promote strength-based programs, encourage work/life balance, while empowering clients to navigate globalization, technological change and turbulent times. Yet, remaining current about Main Street's employment challenges in relation to seeing opportunities in the frontier of science, technology, engineering and math requires career development specialists to put on a unique lens. First, this article offers an explanation of why that unique lens is needed, followed by questions and resources supporting the proposal for a STEM-Centric Career Development orientation.

Breakthroughs Needed

As America recovers from a serious financial crisis, a deep recession, historically low hiring rates, and unemployment beyond expectations, the U.S. faces fundamental challenges about its role in the global workplace and economic order. Unlike cyclical unemployment where layoffs come from temporary pauses in activity, the present structural changes have relocated jobs permanently. Creating new jobs is taking longer, workers are experiencing more stress and less satisfaction, and employers seeking to grow companies face greater credit risks. Research breakthroughs and the entrepreneurial spirit of society's risk takers may soon reverse these effects on a declining middle class. To achieve this, students and adults must face tough choices about how to invest in their future. Few workers can avoid the consequence of competing in a super-integrated world where all aspects of production have become commodities. All raw materials, design, manufacturing, distribution and financing are accessible at anytime from anywhere, by anyone. Advanced education and research development are no longer American landmarks. As a result, assumptions about career development strategies for Main Street workers, college graduates, and outer space explorers need review. Embracing a STEM-Centric career development orientation is necessary if career development is to build bridges across the community and beyond.

Challenging Assumptions

Inertia from a curious mix of myths about the relationships among college majors and jobs, education credentials and job security, wages following one's age, and economic supremacy as a birthright demands examining career assumptions as a new decade begins.

Unemployment has skyrocketed, job security has evaporated, and compensation has declined for most all workers. Retail jobs make up most of the new low wage jobs, and better jobs across all industries demand the application of creativity, innovativeness, and complex thought. Routine and easily defined jobs face competition from automation and outsourcing. Middle class job loss is America's most pressing economic problem. Income distribution and job structure are determined more by education, investment and tax policies than foreign competitors. Yet foreign competition, cheap labor and free trade are easily blamed for the decline of career opportunities. Beliefs about protecting jobs by keeping them at home or not hiring immigrant talent will not affect the realities of labor or globalization. Labor market turmoil on Main Street is predominately a result of technological change and the normal market forces at work.

Providing universal access to health care would reduce most concerns held by the "nervously employed," and portable pensions would excite "knowledge nomads" (Feller and Whichard, 2005) eager to test entrepreneurial and innovative ventures. Regardless of whatever way the current economic crisis is resolved, the future living standards of workers rests on American productivity and how much other countries want what workers create. Career specialists that put aside the old assumptions are laying the foundations of the new bridge.

Sputnik II? Reviving the Competitive Spirit

During the Sputnik era, the U.S. unified around national priorities in response to Russian's race for space supremacy and military muscle. A shared commitment and response to present economic challenges is not evident today. With Asian economic powers expanding, aligning the U.S.'s interest, ability, and sacrifice to develop investments in long term research, education, and economic priorities similar to the National Defense Education Act of 1959 is a significant challenge. Fast forward fifty years. The economic growth paradigm that tied educational credentials to strong financial returns and social mobility for past generations is now exhausted. Vast numbers of low skill manufacturing jobs that paid middle skill wages, and management training programs for fresh college graduates no longer exist. The job creation machine that produced secure family wage jobs for those without current technical skills, high level basic skills, or a commitment to lifelong learning no longer exists. Pink's (2005) questions posed about one's employment potential within the global, technology enhanced, commoditized workplace illustrates the difficulty of career planning decisions.

- Can anyone overseas do it cheaper (than you)?
- Can a computer do it faster (than you)?
- Is what you're selling in demand in an age of abundance? (Pink, 2005)

Preparing educated citizens with added value competencies within an economy lacking global competition or technological change helped career placement offices and vocational forecasting look brilliant. Now, however, a Sputnik II mentality is needed. Suggesting workforce competencies with a long shelf life within the dynamic and rapidly changing global economy is a career specialist's most difficult work. Fortunately, interest in career development's relationship to science, technology, engineering and math (STEM) is a response to the global talent pool reshaping the world order. Those examining how the U.S.'s competitive advantages can create wealth, jobs and higher wages find it easy to be STEM advocates.

Who is Advocating for What?

Concern about the status of American educational superiority, scientific and technical talent, college costs and job creation has historically been voiced by the business community eager to reduce training costs. Liberal arts education advocates argue against vocational training as problem solving skills, communication, critical thinking and the love of learning provide the adaptability for change and should precede work preparation. Often, technical literacy skills and STEM competencies demanding concentrated study career plans are lacking.

Investigative careers, where most STEM careers are classified, employ eight percent of all workers and have the highest cognitive skill requirements, (Reardon, Bullock and Meyer, 2005). And starting in the 1990's, many of the highest-performing students, those with the best SAT scores, and grade point averages, chose careers in fields other than science and engineering (Lowell, Salzman, Bernstein and Henderson, 2009). One could surmise that many of the best-performing students with math and science backgrounds pursued the demand reflected in higher wages in jobs outside of science and technology.

Reports suggest that too few students complete rigorous STEM courses or programs, too many STEM classrooms are led by non-STEM trained teachers, and declining achievement scores relate to a dearth of STEM talent. Lowell, Salzman, Bernstein and Henderson (2009) argue that the problem may not be too few STEM qualified college graduates, but rather that STEM employers are unable to attract them. Highly qualified talent may have chosen non-STEM jobs because of higher compensation, more career stability, and less exposure to competition from low-wage economies.

Natural attributes and interest in STEM can be discounted by popular culture and those lacking STEM success. Educators and counselors with STEM experience naturally understand, promote and have connections to STEM opportunities. Yet failure to focus on the socio-cultural reasons of why parents and learners don't explore or focus on STEM is unfortunate.

> We have a cultural gap in this country when entertainers and sportspeople make the headlines but not scientists & engineers. We need to battle the "geek" perception with a PR campaign – 'STEM is cool. STEM = jobs = progress'... we need to showcase the relationship between STEM and economic growth (parents) and economic well-being (student). (C. Fadel, personal correspondence November 4, 2009)

Most comparative studies and increasing numbers of parents in support of educational choice resonate with U.S. Secretary of Education Duncan's (Schieffer, 2009) claim that

> ... we're lying to children...a child or parent is told that they're "meeting the standard." The logical assumption is that they're going to be OK, that they're on track to be successful. But in far too many places around the country, children who are 'meeting the standard' are barely able to graduate from

> high school and are totally inadequately prepared to go to a competitive university, let alone graduate. (p.61)

Duncan further argues that as a country "we have lost our way. I mean we used to lead the way in the percent of college graduates. We were the envy of the world. And I think we got a little complacent. It isn't so much that we dropped: we're sort of flat-lined." (p.60)

When a client or student asks, "how am I doing" the career specialist needs to ask "as compared to whom" to put the competitive nature of employment value in perspective. Comparisons to specialists, specific geographies, or those with high technical literacy could result in student being on top of that bridge, or not even crossing the bridge to the future. World wages exist for most labor except for specialist workers. And more students and workers are STEM-capable worldwide. As a result, invention, technological innovation, scientific breakthroughs are no longer geographically bound. Exports, making high value labor intensive things, and creating wealth are no longer easy for U.S. workers to produce without high level competencies and technical literacy.

STEM-Centric Career Development

Leadership within career development requires proposing models, strategies and orientations to accommodate the "new normal" while

> ...reinvigorating the professionalized benevolence that was championed by Progressive reformers such as Parsons and renovating the models and materials that they use to help individuals cope with changes in the work world that are every bit as daunting as the changes that transformed human nature in 1910 (Savickas, 2003, p.88).

The following questions support the proposal for a STEM-Centric Career Development orientation within counselor education, career development professionals' training, and programs committed to developing career competencies.

1. How can career assistance inspire clients to engage in STEM courses, programs and career options necessary to solve problems in the frontiers of alternative energy, climate change, nanotechnology, health care, advanced manufacturing and space exploration? These sectors create high wage jobs and rely on basic research and development, design, marketing and sales, and global supply chain management.
2. How can career assistance strategies and resources address skill shortages in science, technology, engineering and math workers, the lagging performance of students in science and math, and the limited STEM literacy of citizens?
3. How can career development professionals collaborate with STEM stakeholders to increase college access, a college-going culture, high quality career technical education, "rigor and relevance" in course and training options, and use of social networks to maximize "real-time" information and mentoring systems?
4. How can career development professionals motivate clients to develop the technical, leadership, inventive and entrepreneurial competencies needed in the evolving workplace, inspire internal drive (Pink, 2009), accelerate career exploration, and enhance career management?
5. How can trainers of school counselors, career development professionals, and adult advisors stay current in understanding the success traits of the evolving school and workplace, increase competence in STEM initiatives, and expand informal and self-directed technological learning experiences and communities?
6. How can advocacy for funding basic research become understood as a job creation strategy?
7. What role do career development professionals have in articulating the relationship among economic development, technology transfer, wealth creation, and job opportunities?

Main Street to Outer Space

A STEM-centric orientation (1) literally builds bridges and partnerships within local communities as it advances technical skills within all occupations, (2) connects the international community as it seeks NCDA's Career Development Facilitators credential as career development grows within developing economies, and (3) promotes the future engineering, scientific, and technical missions of NASA and STEM-based industries which propel space exploration, biotechnology and nanotechnology and solve energy, health, and environmental problems.

Understanding relationships among work and learning options, economic and employment trends, and the importance of STEM

research and development is key to being a STEM advocate. STEM-centric professional development includes intentional efforts to help career specialists understand, evaluate, and promote STEM courses, programs or career options. STEM-centric strategies utilize partnerships among formal and informal STEM education providers for career exploration, stimulating STEM interest, and identifying mentors.

Public and private partnerships improving STEM teacher preparation are receiving support as part of the STEM-centric orientation. President Obama states "Our future depends on reaffirming America's role as the world's engine of scientific discovery and technology innovation, and that leadership tomorrow depends on how we educate our students today, especially in math, science, technology, and engineering." (Obama, 2010) As a NASA consultant I'm encouraged by NASA's leadership in supporting schools' and career counselors' roles within STEM. Career specialists, school and college advisors serve a key "bridge-building" function in course and program selection -- advocating for STEM is critical to developing future careers.

STEM-Centric Resources

Resources, programs, and professional development options are available to support a STEM-Centric orientation. A comprehensive list is continually updated at www.stemcareer.com. Additional sites are listed in Table 1.

STEM for ALL

All educated citizens need to be STEM-literate to apply comprehensive responses to complex issues where technology impacts most major decisions. The National Academies of Science (2007) stress that "all students need to develop their capabilities in science, technology, engineering, and mathematics to levels much beyond what was considered acceptable in the past." (p.1).

STEM content, learning to solve problems and seeing work as "problems needing to be solved" are necessities for anyone seeking career advancement. Mediocrity, redundancy, and passionless effort are not well received or rewarded at any worksite. Difficult futures exist for workers unable to become knowledge workers in manufacturing, retail or personal service.

As career specialists have adopted roles as social justice advocates, the changing nature of the workplace and the global economic order requires adoption of a STEM-Centric orientation to meet changing needs. While evaluating America's ability to stay ahead is less important to promoting a client's well-being, failing to advocate for programs, standards, and opportunities which can cause a client to fall short is unacceptable. A STEM-Centric orientation enhances a career specialist's work and leads to promoting opportunities that build stronger futures for clients and communities on Main Street all the way to Outer Space.

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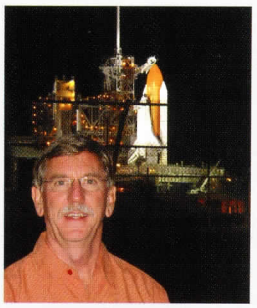

Rich Feller is Professor of Counseling and Career Development and University Distinguished Teaching Scholar at Colorado State University. Recipient of NCDA's Eminent Career Award in 2009 he serves as a consultant to NASA as part of his university position. He can be reached at feller@cahs.colostate.edu

Table 1: Internet Sites Supporting a STEM-Centric Orientation

STEM TOPIC	WEBSITE NAME	LINK
Initiatives	NASA Education	http://www.nasa.gov/offices/education/about/index.html
Promising practices	ITEST Learning Resource Center	http://itestlrc.edc.org
Career planning resources	Sloan Career Cornerstone Center	http://careercornerstone.org
Interest and persistence programs	Arizona State Univ. Virtual Counseling Center	http://vcc.asu.edu/stem.shtml
Funding for scholarships/ fellowships for students, curriculum enhancement, and faculty development	NASA Space Grant (State Listings)	http://www.nasa.gov/offices/education/programs/national/spacegrant/home/Space_Grant_Directors.html
PDI June 29, 2010, San Francisco, CA	NCDA's Career Development Conference - PDI	http://associationdatabase.com/aws/NCDA/pt/sp/conference_info