Richard Zinser

Michigan, USA

WHAT DO YOUNG PEOPLE NEED TO KNOW FOR CAREER SUCCESS?

The goal of education is to prepare young people for the adult working world, but what kind of world should they be prepared for? Technology and globalization are transforming education, and the pace and scope of change makes predicting the future complex and uncertain. In fact many of the occupations that today's students will be working in have not been invented yet. However, there are foundation skills and process skills needed for whatever scenario emerges. Educators therefore should have a broad and long-term perspective about helping students succeed. All subject areas can contribute to a set of competencies that enable young people adapt to rapidly changing career demands.

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What do young people need to know for career success?

1. Universal Foundation. World history and geography studies include an awareness of the world and historical timeline, a basic understanding of civilizations and the migration of people across the globe. Ideally it would not be a lecture-and-quiz course on 5,000 years of political dynasties and wars but would involve the history of art and science as well. The current generation in school has grown up with computers and digital media, and do not realize that these technologies are a relatively recent invention. The study of history and geography can provide a perspective on how civilizations have evolved. Courses should be included in middle school, high school, and college; effective teachers would be knowledgeable of many cultures and enjoy teaching at the global level.

Language and culture. Learning the language and culture of another country, ideally from a different continent, is another important dimension of the curriculum. This level could integrate the foundation skills by utilizing thematic teaching and learning, taking the culture as a context in which to apply the core skills. Studying another country helps students grow beyond nationalistic and ethnocentric attitudes. It shows them that there is more than one way to do things, that beliefs are not universal, and that other cultures have much to contribute to the world. It helps expand awareness, shows the benefits of diversity, while also realizing that all people have the same basic needs. This is more than preparing students to «compete» in world markets. At the high school level students should demonstrate «global literacy» [1] which means being proficient in a foreign language and knowledge of the world, its history and geography, populations and cultures, patterns of interdependence, how cooperation and conflict influence the world .

Schools may have to provide professional development for teachers to add the international perspective in all their disciplines. Subject matter experts in the language and culture of other countries could have alternative certification routes to becoming teachers, and traditionally certified teachers might have an international component in the teacher preparation program [2].

States could infuse international content across all curricula, even adding it as a graduation requirement. Schools can also use new technologies such as immersion programs and simulations to enable students to communicate with other countries.

2a. Academics

Applied math and science. The amount and level of academics required for success in careers are sometimes over-estimated by education leaders and policy makers. Relatively few students, perhaps 15 %, need advanced theoretical courses in math and science; for example, those who are preparing for careers in medicine, computer science, and some fields of engineering clearly need high levels of academics. The majority of high school students however only need two years each of math and science based on studies that determine how much academics are actually used in most occupations. College students start with the basic proficiency level and may take additional math and science courses, such as statistics and mechanics, more directly related to their majors.

Another issue for students is the way math and science courses are taught. Traditionally instruction is teacher led and controlled, which may be efficient for large classes, but many students do not make connections or understand the significance and relevance of the subjects; topics may seem abstract with no application or transfer to the workplace and society. It is up to the teacher to make the connections explicitly or arrange for the student to discover them. In that way the student will find personal meaning, internalizing it and literally putting it in their own words. They will have answered the question: «why do I have to learn this?» Motivation increases when young people connect what they are learning with a future career that interests them. Ideally the courses would be taught in applied or hands-on settings which emphasize the connections among other subjects by teachers with real-world experience. A strategy that has shown much promise is contextual teaching and learning, the primary work of the Center for Occupational Research and Development.

Contextual teaching uses the REACT model [3] to help students connect with math and science concepts; the process applies to all levels of education and transcends the potential constraints of different learning styles. The model begins with Relating or learning in the context of life experience and current knowledge; next comes Experiencing which means students explore and achieve through hands-on activities and solving real problems. Applying is the third step that increases students' understanding through relevant activities outside the classroom. This is followed by Cooperating or learning by sharing and working with others. Finally, Transferring is using the skills in a new situation which has not been covered in class.

2b. Technical skills

General vocational skills include the preparation for a career, or at least a career path. At the high school level the goal is to provide students entry-level skills, for those who may choose to enter the workplace directly, and adequate skills for the transition to college. About two-thirds of occupations require some kind of post-secondary training less than a bachelor's degree, and virtually all jobs require lifelong learning. Most high schools in America award college credit for vocational programs, which gives students a head start in continuing education, and provide work-based learning experiences for a realistic job preview. Certainly occupations will emerge and change, so the idea of preparing for a broad career path-rather than a specific job-may be the best strategy.

For example, a young person interested in a medical career is introduced to all aspects of the profession first, then some basic anatomy, first aid/CPR, lab procedures, soft skills, etc. Thus they learn about the health careers pathway and its multiple exits. If they choose to pursue it in college, many start at the community college level where they can earn a one-year certificate or a two-year degree in one of the technical areas currently in high demand. At that point they could start working and earning in an occupation and later transfer to a university and a four-year degree, exit there, or go on to graduate studies and even medical school. The point is that young people should be encouraged to explore careers broadly and specialize later, rather than aiming

for a specific career which may not be realistic. For many students it is better to experience some early success and then choose to continue on the path.

Technological literacy is a concept introduced by the International Technology Education Association in 1996. It involves the understanding of basic principles of design and operation of many technologies as well as their impact on society and the environment. As technology becomes more complex the fear is that relatively few people will understand how things work and the rest will just know how to turn it on and off. The rationale is that all people should be able to use, manage, assess, and understand technology. Students also learn that the latest technology is not always the best; they understand the concept of appropriate technology and choose what is suitable for the situation.

The public generally thinks of technology as computers, which is correct but not accurate. There are actually seven groups of technology including Medical, Agricultural, Energy and power, Information and communication, Transportation, Manufacturing, and Construction. In the context of literacy, the term *technology* means understanding its broad characteristics, applications, principles and problems. «A person that understands what technology is, how it is created, how it shapes society, and in turn is shaped by society is technologically literate» [4, p. 1]. Technology studies are taught in middle school (grades 6-8 in America) through Introduction to Technology or Principles of Technology courses which cover core concepts and systems and use activities like building simple robots. In early high school some use the modular approach involving units and labs for each technological process along with application exercises. In later high school students may continue studying technology in pre-engineering courses. In college, students study technology in relation to their major interest and how it connects with other fields of study.

2c. Process skills

Systems thinking may be one of the most important skills for global education. It helps young people become comfortable with paradox and uncertainty; it helps them see the whole instead of parts, patterns instead of single events. In contrast to linear or mechanical cause-and-effect systems, complex systems can include many variables and interactions, and often have delayed consequences in time and place, so the connections may not be easily understood. Systems thinking utilizes a set of principles and tools to help make changes and improvements. Senge [5] identified common patterns called «systems archetypes», such as limits to growth and shifting the burden, to help train people in systems thinking. For example, learning to recognize delays in a system, when the effect of one variable is not immediately seen on another variable, helps to avoid overreaction while waiting for the desired result. Another principle is exercising caution about short-term solutions which might create immediate benefits but could be simply delaying the inevitable problem because the root cause in the system is not addressed. Or a solution can work in one part of the system but have unintended negative consequences in another part of the system or at a later time.

This type of thinking is generally not obvious to students so it must be taught through problems and cases. To understand a system, students can create a diagram of the components and interactions; the diagram might look like an iceberg, for example, with the visible portion representing actual events and the lower parts as conditions and behaviors. A more sophisticated system might require causal loops and two or three dimensions to recognize its patterns. Using case studies, students can analyze systems to determine what caused the problem and then discuss various solutions to improve the system. In this way, young people can continuously challenge theories, clarify assumptions, and analyze the generalizations made about certain countries or cultures.

Problem solving skills are a subset of systems thinking but can be applied more broadly. Problem solving should be a systematic and disciplined process which typically follows a stepwise method such as analyze, design, develop, implement, and evaluate. Students soon realize that often there are many possible solutions to a problem, each one having different advantages, costs, impact, etc. The process also develops related skills like communication

(listening, negotiation) and teamwork skills (valuing different perspectives). Each step has specific tools that students learn such as brainstorming solutions, using descriptive statistics to collect data, creating flow diagrams and histograms to analyze problems, and utilizing a decision-making matrix. The practice has been a part of modern manufacturing since the 1980s and is slowly being adapted to other organizations, including education, which adds social and futuristic dimensions to the spectrum of problem solving.

Computer simulations have recently been employed as a problem-solving tool which will likely increase in sophistication. Simulated problems allow students to alter the pace of action, to isolate or eliminate variables, and to reverse decisions-all within a safe environment so effects can be studied. In education settings, it may be a challenge to treat solutions as tentative and subject to improvement compared to back-of-the-book «answers» which students are used to. In fact, learning the process is more important than solving specific problems, which leads to competence in the procedure and a comfort level with facing challenges that at first seem to defy solutions.

Process skills are beneficial for virtually any professional role. A course in «critical thinking» would immerse students in systems thinking and problem solving, and could be implemented in middle school, high school, and again at the college level. The teacher would need to be adept at using a lot of different contexts and real-world problems for students to learn the process. Or the skills can certainly be integrated across many disciplines, perhaps culminating in a senior project in which students draw on knowledge from several courses and apply their proficiency to a problem that has personal meaning to them.

3. Organizational Responsibility, Communication, Relationships

In America there is a lot of emphasis on what are called «career and employability skills». This idea comes from the business perspective which maintains that schools do not always provide adequate preparation in the basic skills needed to be a successful employee at a firm. Even technical courses are often too theoretical, being taught at the knowledge level without relevant application. More important are interpersonal skills such as communicating effectively with co-workers and the ability to work on a team.

A competency-based scheme was developed recently [6] that describes and assesses what every young person needs for working in the 21st century. It starts with basic communication skills that include reading, writing, speaking, and listening in a business environment. Students should also learn critical thinking, work ethics, personal responsibility, and initiative. Some high schools use the assessment as a pre-test for entering the 12th grade and then post-test the students at the end of the year so they can see their progress and get ready for the next step of their career.

4. Life-Long and Life-Wide Learning

Some young people may think that learning ends when they finish formal schooling, but with the explosion of knowledge and rapidly changing technology people will be required to learn for most of their lives to remain successful. It is not difficult to anticipate that working in a certain occupation will involve learning many new skills over a person's career; most organizations provide continuing education and training for their employees, and this will no doubt increase in the future. Instructional technologies such as computer simulations are making company training more efficient and are even becoming new career fields.

In addition to being *life-long* learners in an occupation people should also be *life-wide* learners which means becoming skilled in areas across many fields including interests outside of one's vocation. The idea is that well-rounded individuals are more effective in their professional role as well. Distance learning and e-learning will certainly continue to grow, and with all the resources available on the Internet people have access to almost anything they desire to learn. This will be even more prevalent in the current students' future: they can study a new language, learn a new art or craft, investigate a nation's history, keep up with scientific developments, communicate with people around the world, and many other things not even thought of yet.

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