

## CHAPTER ONE

# What Skills Will Students Need for the 21st Century?

**W**hat skills will students need after they graduate from high school to be successful in the world of technologically driven change in the 21st century? A major focus in education over the last fifteen years has been to equip students with up-to-date technology skills. However, although such skills are critical for students' success, they are not enough if we want our children to keep up with the job market and if we want our country to remain a leader in the world economy. I believe technology skills are secondary in importance to problem-solving skills. I learned this truth the hard way in my early twenties.

### **HOW I DISCOVERED I WAS A "HIGHLY EDUCATED USELESS PERSON"**

While most people were living in blissful ignorance, the thin edge of the microtechnology wedge was forcing its way into the world in the 1970s. Back then, only a few people were participating in this new wave of technological change. I was one of them. I entered the 21st century about twenty-five years early. I bought an Apple II computer and began creating games and educational programs. I wrote essays using a word processor and

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printed them on a dot matrix printer long before most people had even considered the possibility. I brought my computer to my university classes and ended up teaching my professors how to use it because they had never seen a microcomputer before. My technology skills made me somewhat of a phenom.

Nearing the end of my fourth year in university, I was targeted for postgraduate work by one of my professors. The school system had placed its stamp of approval on me as one identified for success. I entered a master's degree program in computerized terrain analysis, a completely new field of study at that time, convinced I was going to change the world.

To pay for grad school, I needed to take some time away from my studies to earn money. My supervising professor arranged a job for me at a progressive cartographic company that was interested in exploring the possibility of purchasing a computer to assist in map production. I was hired as a "research cartographer." I was elated to have landed an important position with a recognized firm in my field of study.

The first few months of the job were exciting. Convincing the owner that computers had worthwhile map-making capabilities was not difficult. All I had to do was show the owner the amazing things I had made the computer produce for assignments at university. He was impressed. I was pleased with my powers of persuasion. Then the owner did something that I was completely unprepared for—he said: "OK, it looks like the computer can do what I need it to do, so I want you to tell me which one to buy. You have a budget of \$500,000." (This was in 1978, when the smallest computers capable of cartography were room-sized and very expensive.) "Go look at systems in North America and Europe and give me your recommendation in six months." Then he left me on my own.

How did I respond? Sheer panic! This was not a hypothetical problem, a theoretically contrived assignment like those I had done in school with only a letter grade riding on the outcome. This was the real thing, with real money and the success of someone's business riding on my work. And there was no instructor there to guide me to the correct answer. I didn't exactly know how to determine what information I needed or where to start looking. And when I did figure out where to go, I wasn't sure what questions to ask. I embarrassed myself in meetings on both sides of the Atlantic with some very high-powered academics and computer

salespeople. There was simply not enough time for me to learn by trial and error the problem-solving skills I needed to get the job done. I made some progress, but certainly nowhere near what I needed to be successful. After feeling my way along for four months, I met with the owner of the cartographic company to give a progress report on my work. The meeting did not go well; the owner was astonished at my lack of progress in determining the best computer system for the company. I was asked to clean out my desk and leave.

I was in shock. I asked myself how this could happen to me. In all my years of schooling, hadn't I been a shining example of what the academic system could produce? If that was the case, then how could it be possible that I didn't have what it took to be a success in my first job related to my field of study? While at school, I had achieved top grades—I had done the research, composed the essays, written the lab reports, performed the math calculations, and created the computer programs. Yet, I was unprepared to face the world. My schooling had let me down. I was a product of a system that focuses on abstract theoretical instruction and information regurgitation testing. I had lots of schooling but little ability in applying my learning. I was a "highly educated useless person," very skilled in doing school-related tasks, but lacking the abilities necessary to solve problems independently in a real-world environment. The fact that I was an academic star and possessed exceptional technological skills didn't amount to a hill of beans when it came to being successful in that job. Now, looking back, it's obvious to me how I should have tackled that problem, but at the time, I was at a loss. Over the years, I have talked to many people about their experience leaving school and getting a job. I have discovered that I am not alone in encountering difficulty making the transition from school to the world of work.

## **HOW I DISCOVERED I WAS PRODUCING "HIGHLY EDUCATED USELESS PEOPLE"**

I have worked with Grade 11 and 12 students for more than twenty years, and one thing that continues to amaze me about the young adults who arrive in my classes is their almost complete lack of ability to work on tasks without guidance from me. They may be

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“A” students and possess impressive technology skills, but they have not yet learned to be independent thinkers. When I press them to outline the steps they would take to solve a problem, the overwhelming majority of them have no concept that there could even be a structured process to follow, let alone have the ability to implement that process successfully to find a solution to a problem. What will happen when these students leave the school system and have to make it on their own in the working world? Most of these young people are just like I was—they are “highly educated useless people.” After discussions with many teachers around North America, I am convinced this is a common situation. How can we say we have done a good job of preparing students for life if, by the time they have been in school for ten or more years, they still don’t know how to solve problems on their own?

This lack of problem-solving ability in students is news to many educators. Many teachers feel that the work that students do in school is relevant and useful for the world in general. But is that true? It is important to stop and examine the kinds of skills students acquire as they pass through our classrooms. Do the assignments and tests we give really develop the higher-level thought and problem-solving skills we believe they do? Are we equipping students with the thinking skills necessary for success in the world outside school? Or are we just teaching skills that will enable students simply to move to the next level of the school system? It is important for us to consider what happens when our students reach the end of their schooling.

As I said, I was amazed that teachers were not equipping the students who arrived in my classroom with real-world thinking skills, but I never thought that I was part of the problem. After all, I came into education to make a difference. I worked hard to make my lessons engaging, and I was convinced my teaching was interesting and effective. Then along came Lisa.

Lisa was a lot like I had been. Having grown up with technology, she was completely comfortable using it. More important, she knew that technology would play a major role in her life, and she was determined to develop the technology skills she would need. She was an excellent student who consistently scored more than 90% on all her assignments and tests. I pegged her as a person destined for success. One day I asked Lisa a question—not a very unusual occurrence in a classroom, but for some reason what

took place on this particular day absolutely rocked my world. The question I asked Lisa, which covered a major topic in the course, was the exact same question that I had asked on a test she had taken just two weeks earlier. She had answered the question correctly on the test, but, to my utter amazement, Lisa could not now answer the question in class. She knew we had covered the material, but she could not recall the specific answer. This stopped me in my tracks. Her inability to answer this question triggered a startling line of thought in my head. Just what exactly were students learning in my classes, anyway? If Lisa couldn't remember what we had covered recently, what about the other students who were not as academically capable? If students were so quickly forgetting the material I was presenting in my classes, then what were they left with? Was it possible that I was doing to Lisa and the other students exactly what had been done to me? Would they pass my course and then go on to encounter difficulty in the world outside school?

It dawned on me that I was mistaken in thinking that I was imparting truly useful knowledge to my students that they would be able to use later in life. Instead, I was teaching them how to cram for and write a test. But how often is a person's success at work dependent on the ability to write an exam? Although most employee evaluations are performance based, we don't use that type of evaluation very much in the school system. Much to my dismay, I realized that even with the best of intentions, there was something fundamentally wrong with my approach to teaching. I was producing "highly educated useless people." Instead of equipping students with useful real-world skills as I had hoped, what I was really doing in my classroom was teaching my students school skills.

## **SCHOOL SKILLS**

*School skills* are those skills that are necessary for success inside the school system. They are very useful in school because they enable students to move to higher levels of schooling. School skills are focused on training students to perform well on written tests to get good grades. The central skill set involves cramming vast amounts of information into your mind for the purpose of low-level

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recall with the goal of getting higher test scores. A secondary set of skills focuses on retrieving details in the content of course material for the purpose of completing assignments. Hence, students in many classes are given worksheets to complete that require them to hunt for specific answers and fill in the blanks. This gives the teacher evidence that students have read the material for a course as well as prepares students for a test by providing them with sheets of details to study. In fact, many essay and report assignments are also little more than fill-in-the-blank exercises because the student is frequently given all of the criteria for such a project that outlines how the work should be done.

More often than not, assignments focus on the retrieving of the content rather than on the analysis of that information. In these exercises, teachers often give the message explicitly or implicitly that more is better—for example, by saying, “If you want an A on this assignment, then it must be at least five pages long.” Consequently, the students develop research skills geared toward reporting as much content as possible, not on assessing that content for what it really means. We continue to focus almost exclusively on content right up to the time students leave us. Take a look at the curriculum in a Biology 12, English Literature 12, History 12, or Mathematics 12 class. The amount of material that must be covered is staggering. Most teachers do not turn their students loose on creative, high-level thinking projects because they can’t afford the time such exercises take. Instead, they provide a lot of structure to keep students focused on absorbing course material. Although we aspire to teaching critical thought, our priority is really to cover the content in the curriculum, not to develop higher-level thinking skills. In our desire for our students to achieve higher test scores, we place too much emphasis on short-term memorization of content.

School skills are mainly concerned with the assimilation of content. They are based on the notion that information alone is all we need to give students to prepare them for life. The thinking goes that if a person comes to “know” a certain body of facts, they are educated and ready for the world at large. In his 1987 book, *Cultural Literacy*, E. D. Hirsch lists 15,000 facts he believes a person needs to know to be considered educated. His perspective on learning provides the rationale for many of the standards being set for education today. His facts provide the specific content that students must master. This powerful and pervasive view of education underlies much of what we are asked to do as teachers. A great deal of our

time and effort goes into developing skills that empower our students to memorize facts.

School skills are not without value because they can earn students much positive feedback from teachers and parents. Eventually, if students master these skills well, these techniques can enable students to enter prestigious postsecondary institutions and to earn a considerable amount of money in scholarships. In addition, teachers and administrators receive accolades when their students demonstrate abilities with school skills. In some cases, school and district funding as well as promotions for administrators are tied to how well students acquire school skills.

School skills are very powerful, indeed! The entire education system is built around the teaching and testing of school skills. In light of all the emphasis that has been placed on developing school skills, it is critical that we ask a fundamental question: Are school skills the kind of skills that students will need to be successful when they leave the school system?

## **REAL-WORLD SKILLS**

Some of you may be thinking, “Hold on, what’s the big deal? Students have been graduating from our schools for years, and they have been able to do just fine in the working world. How can you now say that there’s a problem with the way we are teaching students in school?” First of all, from my own personal experience at the map-making company I can tell you that, for some time, students have not been doing “just fine” in the working world after graduation. Furthermore, because the working world has changed radically in the last twenty-five years, there is an increased need for educators to prepare students differently for success in life in the 21st century.

In the last quarter century, the working world has undergone a significant change as a result of the explosion of microelectronics into everyday life. The power of this new technology to increase productivity and to reduce costs has been so compelling it has been implemented widely and quickly in the business world. This rapid proliferation of the use of electronic technology has upset the status quo that existed in the very stable late Industrial Age life of the 20th century. Not only has this technology changed the tools that people use in their jobs, it has forced businesses to reexamine the

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very premise of the Industrial Age—the compartmentalized, assembly-line thinking that breaks tasks into subtasks and requires people to become specialists in one small part of a much larger process.

In the Industrial Age workplace, most workers were not required to do much thinking at all—they simply learned the particular procedures for their part of the business or manufacturing task. Only the managers responsible for the whole process were required to think beyond a specific subtask. This organizational structure was the same whether you worked in a bank or on the production floor of an automobile company. In this environment, students could easily graduate from high school and fit right into most jobs without having independent problem-solving skills.

But this is not the case in a rapidly growing number of businesses today. There is an increasing demand for independent thought and high-level problem-solving ability from workers at all levels in the modern workplace. This demand has significant implications for education. Industrial Age schooling focused on rote memorization of content because these skills transferred well to the workplace, where Industrial Age businesses required the vast majority of their workers to memorize procedures for their jobs. In contrast, 21st century businesses have reorganized the way tasks get done. Such companies need workers who can use their minds for much more than just memorizing information; they need employees who can evaluate the relative importance of information and make judgments based on that evaluation, and workers who can creatively apply the power of new technology to increase productivity. They need people who can solve problems without direction from management. Here are two examples—one blue collar, one white collar—from the modern workplace.

Genie Industries in Redmond, Washington, is a company that typifies the new thinking in modern business. Genie is one of the world's largest producers of hydraulic lift equipment. Like many companies dealing with the changes in the global economy, Genie reorganized its operations twelve years ago to make the company more competitive. What is interesting about this reorganization is the empowerment of front-line workers to make decisions. As a result, the kind of thinking done by these workers has undergone a significant shift. Previously on the assembly line, each worker had a single specific job to do. All a worker had to worry about



was his or her specific part of the assembly process. Management oversaw the efficiency of the production line as a whole and dealt with any problems that arose.

However, in the reorganized company, front-line workers are responsible for the entire production line. In the manufacturing of scissors lifts, for example, there is a series of red lights along the production line. One of these lights begins to flash when there is a problem holding up the assembly of lifts. When this occurs, workers on the line go to the trouble spot and solve the problem as quickly as possible. There is no abstract theory here; practical solutions are needed immediately so production can resume. The fact that bonuses are paid for keeping the assembly line moving provides real motivation for the front-line workers to be able to problem-solve effectively.

Another change in responsibility for front-line workers at Genie is a result of the company's "Rapid Improvement Program." The goal of this program is to continually improve the efficiency of the company's production process. In this program, workers who represent a wide cross-section of employees are pulled away from their jobs for a morning to tackle a problem of inefficiency in the manufacturing process. Ideas developed in the morning are implemented in the afternoon. Effective participation requires workers to use much higher-level thinking than was required before the company reorganized. Like workers at many new companies, workers at Genie are required to have problem-solving skills, teamwork skills, and effective communication skills. This new skill set is needed in addition to the basic technology skills—such as welding, painting, assembling, and so on—that have been required for the past thirty years. Blue-collar work simply isn't what it used to be.

White-collar work is also changing. Consider the kinds of skills required of employees who work in offices that are connected to the Internet. Many companies with branch offices in different time zones have realized that they can speed up production by forming multioffice work groups that work on projects longer than a standard eight-hour work day. The idea is that one branch office works on a project for an eight-hour shift and then passes the work along to another branch office in another time zone. That branch office works on the project for a shift and then passes the work on to another branch office in yet another time zone. International companies that use this strategy can work on

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projects twenty-four hours a day. Because much office work today is accomplished with computers that are connected to the Internet, the passing of work around the globe is actually quite straightforward. However, although connecting the computers is easy, getting workers to problem-solve jointly with people they never meet with face to face is a challenge. Success depends on creative thinking and effective communication by those involved. Workers have to think much farther ahead and anticipate problems. In addition, workers must be flexible because they must be able to respond to whatever problems or breakthroughs occurred while others were working on the project.

Now comes the critical question: Will traditional school skills used for writing tests and doing assignments prepare students for these kinds of working environments? The answer, of course, is no. Outside the school system, school skills won't cut it. For an increasing number of jobs in the modern workplace, completing worksheets, collecting information to write a report, or studying for multiple-choice tests does not equip students with the skills necessary for succeeding. Because the school system is so disconnected from the realities of the working world, it is quite possible for students to develop a skill set that works well inside, but not outside, school. Although school skills may help students get a scholarship or be admitted to a postsecondary institution, such skills probably won't be of much help when these former students get a job. If you consider how many university graduates are moving back home or going on to further study because they can't get a job, you begin to see the scope of the problem.

Furthermore, it is important to equip students with useful problem-solving skills because being able to think logically and independently is just as critical for solving personal and household problems as it is for solving work-related problems. What we are really talking about here is providing students with life skills. It is time for educators to reconsider the relevancy of what we teach.

### **“STAND AND DELIVER” LECTURE-STYLE TEACHING**

We aspire to do good things for our students, to prepare them for success in the modern workplace. The reality, however, is that our

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teaching reinforces school skills much more than real-world skills. With the increased testing being brought into K–12 education in the last ten years, there is an overemphasis on the memorization of content. Let's listen in on a lesson being given in a Social Studies class, which is typical of the kind of teaching that takes place every day in thousands of classrooms across North America. What kind of skills are being developed, and what kind of thinking is being encouraged?

Students shuffle into the classroom, talking and playing around until the bell rings. The teacher gets up from the desk and starts speaking.

"OK, the bell has gone, so take out your notebooks and let's get started. Phillip, sit down and be quiet."

Just then, two students burst into laughter in the corner.

"Susan and Melissa, please get your books out and pay attention, or I'll have to separate you," says the teacher. "Julie, can you tell me what we were talking about at the end of the last class?"

After a short pause, Julie replies, "I can't remember . . . wasn't it something about Tokyo?"

"No, that's not correct," says the teacher. "If you would just learn to take better notes, you would do much better in this course. In fact, you all need to make sure you are taking better notes because next Tuesday morning there's going to be a . . ."

"Test," says the class collectively.

"That's right," replies the teacher, "so pay attention. We were talking about the Kansai region of Japan at the end of last class. The region has three major cities—Osaka, Kobe, and Kyoto. Now it is important that you remember the following information for your test. Osaka is the largest and most important city in this area. It is a major port and financial banking center, and the city functions as a hub for the region. It has a population of 2,506,000. The chief economic activity here is heavy manufacturing. Kobe is the next city we need to look at in the Kansai region. Kobe has a population of 1,459,000. It is also a port and, consequently, there is a large ship-building industry here. Kobe is also known for its steel smelters and textile production. Another point about Kobe is . . ."

The teacher looks up and realizes one of the students has not written down a single thing this period. He doesn't even have his notebook open.

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"Bob, have you been sitting there this entire time without taking any notes at all?" the teacher asks incredulously.

"I don't have a pen," mumbles Bob, smiling nervously as he looks around at the other students.

"Well, borrow one!" bellows the teacher. The class waits while Bob gets a pen from one of the other students. Just as the teacher is about to begin teaching again, he notices one of the students passing a note to another.

"Barbara, give me that note." Barbara sheepishly hands the teacher the note and sits down.

"Now, where were we? Yes, the next major city in the Kansai region is Kyoto. Kyoto has a population of 1,461,000. The major economic activity here is heavy manufacturing, copper smelting, and chemical production."

"Hey, why do we have to learn this stuff, anyway?" interrupts one of the students.

"Because the Department of Education says so," replies the teacher. "It's the next section in the course outline. Now don't get off track, we still have some material to cover that you'll need for the test. We were talking about Kyoto. One of the most interesting aspects of this city is its history. In fact, Kyoto is so rich in cultural artifacts and historical sites that the Allies made a conscious decision to spare Kyoto from bombing during World War II. A unique feature of the transportation system in this area is the high-speed bullet train that links the three main cities.

"Now in preparation for the test next week, I want each of you to do a report on this region of Japan using pages 57 through 69 in your textbook. The report must list the population of each of the three cities, the major economic activity in each, and any special features. Please include a map and indicate the major transportation routes. You will get bonus marks if the map is colored."

What does the teacher focus on in this lesson? Does he concentrate on the process of solving problems? Is he intent on equipping students with skills that will serve them well in the long run when they leave the school system? No, the teacher in this lesson is focused on two short-term tasks: delivering the course content and classroom management. The goal is to cover the material in the curriculum so the students can write a test. The assignment reinforces the material to be memorized. The teacher is using the

“stand and deliver” approach to instruction. Because the instruction is so boring, classroom management skills are required to keep the students on task. It is amazing how many teachers teach their classes this way.

Consider the role of the students in the Social Studies lesson we just heard. Are they active participants or passive listeners? What level of thinking is required to function successfully while in class and while doing the homework report? What level of thought will be required to do well on the test? The truth is that students will need little more than low-level recall skills to be successful in this class. But that leads us to a critical question: What practical skill development has taken place here that will be useful for these students in the long term? Is coloring a map an important real-world skill? Is memorizing the specific information about this region of Japan going to yield a valuable skill for students after they graduate? When the students forget most of the specific content (as we know they will in the long run), what will they be left with? They will be left with school skills, the kind of skills I had when I ventured out of the school system and promptly got fired. These students will be able to take notes on the most important facts in a presentation from a teacher, read a textbook, and do a report that reinforces those facts. Then, they will be able to recall that material for a written test a few days later. The problem is that these skills are not widely in use in the world outside school.

## **THE MYTH OF POSTSECONDARY EDUCATION**

Many teachers argue that the skills students currently acquire in public school are necessary and valuable for their success in postsecondary schooling. These teachers consider it their primary job to prepare students for schooling after high school graduation. They claim that they don't have to focus on practical skills because students will get their real-world training when they go to a postsecondary institution. However, the fact is that most students in high school do not attend, let alone graduate from, universities or other postsecondary institutions. Barry Schuller, the president of AOL Time Warner, said that his research indicated that only 21% of adults have a university degree by the time they reach the age of 30 (Schuller, 2000). According to *USA*

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*Today*, the U.S. Census Bureau's Educational Attainment in the United States 2003 Study says only 27.2% of high school graduates 25 and older had at least a bachelor's degree ("More People," 2004). It is clear that the majority of students graduating from high school will not graduate from college. But if you walk into any high school, you will find that the overwhelming majority of courses and counseling are focused on getting students ready for postsecondary education. The educational system is clearly out of sync with the realities of the world outside. By ignoring where students actually go after they graduate from school, we are not equipping them with the skills they need for success in the world they will face upon graduation.

It is critical that teachers, administrators, bureaucrats, politicians, and parents understand the myth of postsecondary education. Higher education is simply not in the future of most young people. And of those who actually attend a postsecondary institution, many will not graduate. Furthermore, of those who do graduate, only those in specialized programs will have acquired skills that will help them get a job. That brings us to another very important question for educators teaching in the K–12 school system: Where do the majority of students get the skills necessary for success in the world of work? The answer is that most people must survive in the working world with the skills they learn in their K–12 schooling. But if students don't possess relevant job-ready skills when they leave Grade 12, how are they going to get good jobs, if they can get jobs at all?

## **IT'S TIME TO RETHINK HOW WE TEACH**

Some of you may be thinking that it is all well and good to talk about the irrelevancy of teaching methods that result in students learning only school skills; however, with the massive amount of material in the curriculum to be covered and with the increased testing students face, teachers have little choice but to focus on content delivery in their classrooms. Besides, there are a lot of people who equate knowing facts with being educated. So it looks like focusing on teaching content to students is here to stay.

Of course students must learn content in school. I agree with Mr. Hirsch that to be educated, students must know a certain body

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of information about the world around them. Certainly, an educated person should have an appreciation of history, art, music, geography, languages, government, literature, science, and mathematics. However, an educated person must also have the ability to think logically and to solve problems effectively. Learning specific facts without acquiring the thinking skills necessary to assess the significance of those facts is of little lasting value. If the focus of our teaching remains on content, our students will develop only school skills. But students will need more than school skills to be successful when their schooling is over. Students need reasoning skills if they are going to be successful in the world of the 21st century. And they need to acquire these skills in their K–12 education because the majority of students will not go on to complete a postsecondary program.

It is clear that we need to rethink how we teach students if we want to prepare them for the world they will encounter when they leave the school system. In the technologically saturated world of the 21st century, it would be easy to assume that the answer is to simply equip students with up-to-date technology skills. Technology skills are important, but they are not enough. What is needed is a fundamental shift in the way we present material to students. We need an instructional approach that will equip students with real-world, problem-solving skills plus teach them the content they must master to be an educated person. As presented in Chapters 2 and 3, this requires educators to question some long-held ideas about what teaching should look like.