Chapter 1
Where Are We Now and How Did We Get Here?

> Change is the law of life.
>
> John F. Kennedy

What Is the Goal of Education?

It is commonly understood that the goals of education have remained the same for generations.

- Acculturation of the individual
- The appreciation of the aesthetic, esoteric, philosophical, and moral
- Preparation of students for their lives beyond school

These goals may have remained the same over decades, but we are witnessing a shift in the skills that students need to be successful in the 21st-century economy.

We are now reaching the tipping point; our society demands a different type of learner to meet the challenges and needs of the 21st-century economy. Instructional models, assessment models, and learning opportunities are shifting to meet the desires of today's student and the requirements of tomorrow's workforce. We are redefining the goals and ambitions of today's and tomorrow's educational systems. How will schools react to this new reality? It is not only about modalities and methods; it is about new tools and opportunities for learning for both students and adults.

More often than not, a high school education does not adequately prepare students for postsecondary education or the world of work. A shift must take place that pays attention to developing 21st-century skills and increasing the relevance and engagement of the school curriculum. These changes must hold true for all students, especially those who have traditionally faced obstacles, to have an enriching and successful educational experience.

If we are to recognize that the goals of education have changed, we must recognize that the skills required of 21st-century learners have changed also.

We have asked teachers, principals, superintendents, community leaders, parents, and students across the world to name the skills that students must have to be successful in the 21st century. They all come up with the same list of skills:

- *Problem solving*—Students need the ability to solve complex problems in real time, deciding what is reliable information on the Internet.
- *Creativity*—Students need the ability to think creatively in both digital and nondigital environments to develop unique and useful solutions.
- *Think analytically*—Students need the ability to think analytically by comparing, contrasting, evaluating, synthesizing, and applying without instruction or supervision (all higher level skills on Bloom's Taxonomy).

- *Collaborate*—Students must possess the ability to collaborate seamlessly in both physical and virtual spaces, with real and virtual partners globally.
- *Communicate*—Students must be able to communicate with text, speech, and multiple multimedia formats. They must be able to communicate visually (through video and imagery) in the absence of text as actively as they do with text and speech.
- *Ethics, Action, Accountability*—Students must exhibit qualities such as adaptability, fiscal responsibility, personal accountability, environmental awareness, empathy, and tolerance.

These are the skills students now need to be successful in the world they enter, regardless of their intention to attend postsecondary school, take vocational training, or enter the workforce. The issue remains: Are schools preparing students for the ever-changing global economy?

By all estimates, today's students will likely have 10 to 14 careers in their lifetimes. Given this new reality of job-hopping, students must acquire a whole new set of skills beyond rote memorization. To be valued members of the 21st-century workforce, today's students—more than those before them—must have skills that enable them to be flexible and adaptable.

The debate must shift beyond content knowledge versus skill development to one of skill and content knowledge. Education experts Rotherham and Willingham (pg. 18, 2009) assert:

> *There is no current responsible stakeholder that is arguing against ensuring that all students learn how to think in school. Rather, the issue is how do schools evolve meet these new challenges of ensuring students develop content mastery and develop the 21st-century skills in a rich way that genuinely improves outcomes for all students.*

School and district educational leaders must ask themselves the following questions:

1. How has our school/district developed a sense of urgency for change to improve student learning and teacher practice?
2. How does our school/district provide opportunities for students to ask, analyze, synthesize, assess, and transform data to create knowledge?
3. How does our school/district promote student learning activities through the integration of educational technology (ET) that is aligned with curricular goals and student achievement goals?
4. How does our school/district support the collaboration between home and school for extending learning beyond the school day?
5. How does our school/district communicate to ensure a common understanding of all ET-related policies and procedures with all community stakeholders?
6. How does our school/district provide a wide range of staff development options for all teachers that align expectations and accountability for ET integration?

If the answer to any of those questions is "We haven't," then your school or district needs to ask itself, "What exactly are we preparing our students for—our future or theirs?"

The Creative Class

Our current education system was designed for the Industrial Age, and for the most part, it has not evolved to meet the needs of a digital age and the realities of the 21st-century student.

In the book *The Rise of the Creative Class*, Richard Florida says you can divide the U.S. workforce into four basic groups: the agricultural class, the working class, service workers, and the creative class. (See figure 1–1.)

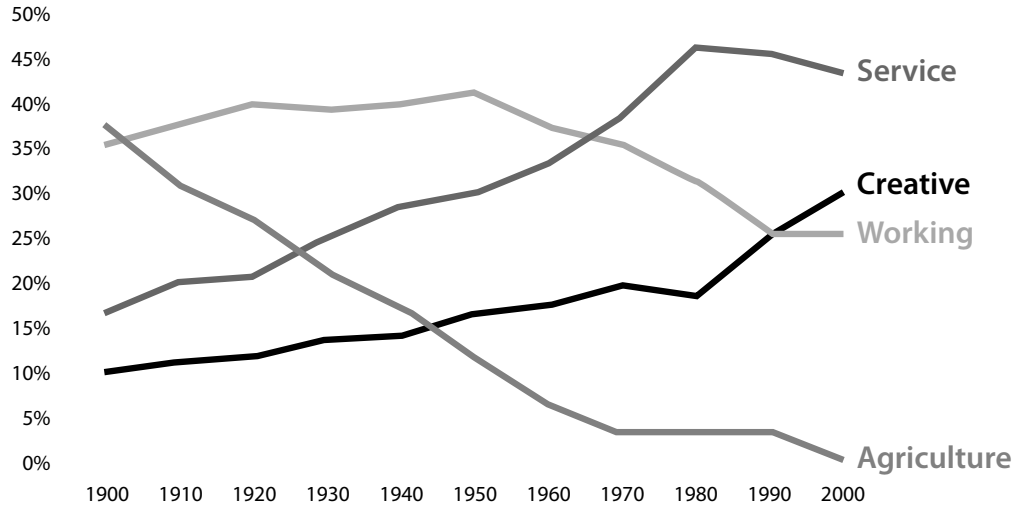


Figure 1–1: *The Rise of Workers in the Creative Class. (Source:* The Rise of the Creative Class, *R. Florida, 2002)*

In 1900, almost 40% of workers were involved in agriculture. In 2010, the agricultural class was down to less than 2% of the workforce, primarily due to automation. What used to be done by dozens of workers and animals can now be done by one worker and a single machine.

The second group is the working class. These are classic manufacturing jobs—the jobs that only require basic skills to perform. Richard Florida shows that these types of jobs peaked right after World War II and have been in steady decline ever since.

Location-dependent workers are the routine cognitive workers and those who work in the service industries or helping professions. These types of jobs peaked in 1980 and are now steadily shrinking, primarily because of the growing power of personal computers.

The creative class does nonroutine cognitive work and applies 21st-century abstract skills on a regular basis. There has been a sharp increase in the demand for creative class workers since 1980. Once again, this is primarily because of the appearance of the personal computer—creative class jobs are facilitated by technology, not replaced by it.

We must ask ourselves whether schools today are adequately preparing students to be competitive members of the 21st-century economy.

Moving to a Fluency Learning Environment

A series of educational reforms over the past few decades has been aimed at improving education for students across America. No Child Left Behind (No Child Left Untested), federal testing, state testing, and merit pay (tying teacher's salary to student success rates) are just a few. At the same time, we have witnessed an explosion in school-choice vouchers, charter schools, and private and online education options. The question is: How can we evolve the educational experience for all students to make it relevant, engaging, and challenging?

Models of instruction and evaluation must move from rote memorization to real-world problem solving. Students must be able to demonstrate their knowledge in a technology-rich learning environment.

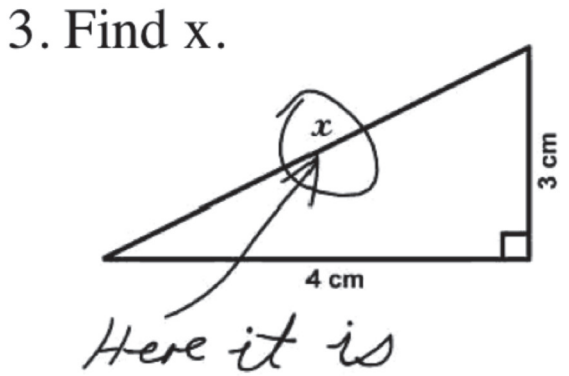


Figure 1–2: *Can you find x?*

The image above is found on many of the math exams that are given to students across North America everyday. Take note of how one particular student answered this question. Then, ask yourself: "Are we asking the right questions?" In this case, it is a question that has no relevance to the life of a student beyond the four walls of the classroom. We must make the shift beyond solving for "*x*" to creating, analyzing, and assessing what "*x*" can become.

Slow Progress

As far back as 1938, progressive thinkers have been questioning whether the long-held goals of education are enough. Prefiguring our contemporary dilemma, a 1938 report by the National Education Association and the American Association of School Administrators warned:

> *Most of the standardized testing instruments [and written examinations] used in schools today deal largely with information. . . .There should be a much greater concern with the development of attitudes, interests, ideals, and habits. To focus tests exclusively on the acquisition and retention of information may recognize objectives of education that are relatively unimportant. Measuring the results of education must be increasingly concerned with such questions as these: Are the children growing in their ability to work together for a common end? Do they show greater skill in collecting and weighing evidence? Are they learning to be fair and tolerant in situations where conflicts arise? Are they sympathetic in the presence of suffering and indignant in the presence of injustice? Do they show greater concern about questions of civic, social, and economic importance? Are they using their spending money wisely? Are they becoming more skillful in doing some useful type of work? Are they more honest, more reliable, more temperate, and more humane? Are they finding happiness in their present family life? Are they living in accordance with the rules of health? Are they acquiring skills in using all of the fundamental tools of learning? Are they curious about the natural world around them? Do they appreciate, each to the fullest degree possible, their rich inheritance in art, literature, and music? Do they balk at being led around by their prejudices?*

If students are expected to develop higher order thinking skills in conjunction with content mastery to meet the requirements under such legislation as No Child Left Behind (NCLB), one of the resources available for reference is Edgar Dale's Learning Cone (figure 1–3 on the next page), an evaluation of the levels of action that promote and ensure content mastery.

The lowest level of mastery is promoted through only reading, for which, after two weeks, recall of information will be 10% of the content presented.

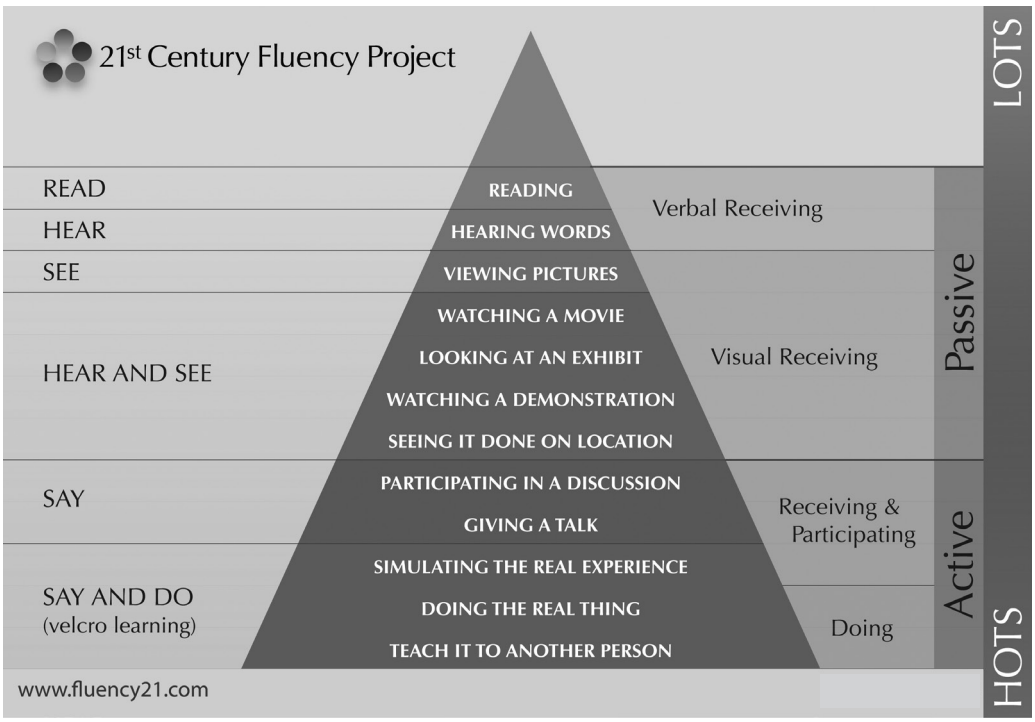


Figure 1–3: *Edgar Dale's Learning Cone (Source: Bethel National Training Lab, 1956, designed by Lee Crockett)*

Conversely, simulation and experience—an active learning process that also intertwines skill development—leads to 90% recall after two weeks. If we are aware of the huge effect that active learning and skill development have on content mastery, why are most schools teacher centered and using practice learning through full frontal lecture? Through the implementation of a fluency learning environment, the active learning process directly involves students in constructing and demonstrating their learning through multiple means that ensure content mastery and skill development.

By comparison, in Benjamin Bloom's (1956) Taxonomy (figure 1–4), we see that there are strong lessons to be learned from what researchers such as Bloom and Dale have said about how learning must occur to have the transformative affects we desire in education. We must view student and adult learning as interdependent factors in the progress and advancement of our schools and districts. We will not witness any of the gains in student success that are required without first addressing the professional development needs of the teachers and staff. These are the kinds of professional growth and development progressions that must occur at a much higher level than what is currently being seen in education. Student learning and teacher learning must be viewed using a much different lens than what we're looking through right now.

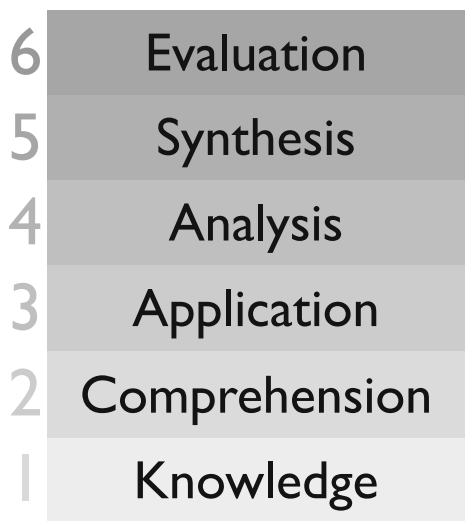


Figure 1–4: *Bloom's Digital Taxonomy (original)*

Using Andrew Churches' Bloom's Digital Taxonomy (figure 1–5), we are able to visualize what 21st-century skills students must develop and on what level they should be working.

Creating	Designing, constructing, planning, producing, inventing, devising, making, programming, filming, animating, blogging, video blogging, mixing, re-mixing, wiki-ing, publishing, videocasting, podcasting, directing, broadcasting	HOTS
Evaluating	Checking, hypothesizing, critiquing, experimenting, judging, testing, detecting, monitoring, blog commenting, reviewing, posting, moderating, collaborating, networking, refactoring	
Analyzing	Comparing, organizing, deconstructing, attributing, outlining, finding, structuring, integrating, mashing, linking, validating, reverse engineering, cracking, media clipping	
Applying	Implementing, carrying out, using, executing, running, loading, playing, operating, hacking, uploading, sharing, editing	
Understanding	Interpreting, summarizing, inferring, paraphrasing, classifying, comparing, explaining, exemplifying, advanced searching, Boolean searching, blog journaling, Twittering, categorizing, tagging, commenting, annotating, subscribing	
Remembering	Recognizing, listing, describing, identifying, retrieving, naming, locating, finding, bullet pointing, highlighting, bookmarking, social networking, social bookmarking, favouriting/Iocal bookmarking, searching, Googling	LOTS

Figure 1–5: *Bloom's Digital Taxonomy, revised by Andrew Churches*

The 21st-Century Fluencies

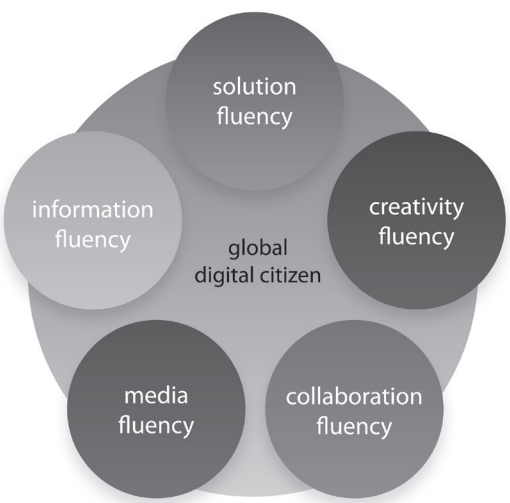
The authors believe that through fluency development, a school or district will be able to make the transition from the traditional model of instruction and learning to a 21st-century model of instruction and learning. Let's take a more in-depth look at what exactly is meant by 21st-century fluencies.

Solution Fluency

Solution fluency is the ability to think creatively to solve problems in real time by clearly defining the problem, designing an appropriate solution, applying the solution, and then evaluating the process and the outcome.

Information Fluency

Information fluency is the ability to be able to unconsciously and intuitively interpret information in all forms and formats in order to extract the essential knowledge, authenticate it, and perceive its meaning and significance.



Creativity Fluency

Creative fluency is the process by which artistic proficiency adds meaning through design, art, and storytelling. It regards form in addition to function as well as the principles of innovative design combined with a quality functioning product.

Media Fluency

There are two components of media fluency. First is the ability to look analytically at any communication media to interpret the real message, to discern how the chosen media is being used to shape thinking, and to evaluate the efficacy of the message. Second is the ability to create and publish original digital products, matching the media to the intended message by determining the most appropriate and effective media for that message.

Collaboration Fluency

Collaboration fluency is teamwork proficiency that has reached the unconscious ability to work cooperatively with virtual and real partners in an online environment to create original digital products.

Global Digital Citizen

All the fluencies are learned within the context of the global digital citizen, using the guiding principles of personal responsibility, digital citizenship, global citizenship, altruistic service, and environmental stewardship.

What We've Learned About Technology Initiatives

After spending exorbitant amounts of taxpayers' money buying technology to engage students and increase student learning, many districts are being placed in the uncomfortable position of asking why so much of their newly installed equipment is sitting underused or even unused.

Many schools and districts have undertaken technology initiatives with the intention of creating classrooms that are technology rich. Indeed, new technologies have tremendous potential to transform learning environments, yet in many of those schools and classrooms, technology is being used to reinforce old models of teaching and learning using new tools. Schools and districts have reacted to the technology movement as if it were a race to purchase "stuff" rather than targeting pedagogy, teaching, learning, and assessment to meet collaboratively developed student success targets and shifting teacher practice. Insufficient technical and pedagogical support and vision will lead to technology tools sitting on shelves, student and teacher frustration, and decreasing usage.

School districts have also asked what they might have done differently to achieve a measurable return on their technology investment. They are asking what they need to effectively use technology to improve student performance in reading, writing, language, thinking, and computation. More than anything else, they want confirmation that the large investments they have made or plan to make for instructional technology can help learners meet state or provincial standards, score well on high-stakes tests, and prepare them for life beyond school.

The school districts that proceeded cautiously while designing new schools and are beginning to design their technical infrastructures are asking many of the same questions; however, they are asking these questions before they finalize their plans or commit their funding. These districts want to learn from the experiences and mistakes of the districts that were early adopters. They want to avoid developing isolated islands of technology use, and

they strive for a broad-based acceptance by all teachers and learners to the sustained use of these new technologies. They want to invest in new technologies not just to look good or be progressive, but so they can build the strong grounding in information skills necessary for all learners as a basis for living, learning, and working in the modern world.

Our experience has taught us that an effective and successful implementation of technology requires a well-designed and collaborative plan that addresses such issues as leadership and planning; a supportive, collaborative school culture; professional development for all members of staff; robust infrastructures; technical support; and access to digital instructional, learning, and assessment resources. Specifically, leadership will have a huge effect on the success of any technology initiative. Effective leaders possess a compelling vision of how teaching and student learning must evolve to meet the needs of students.