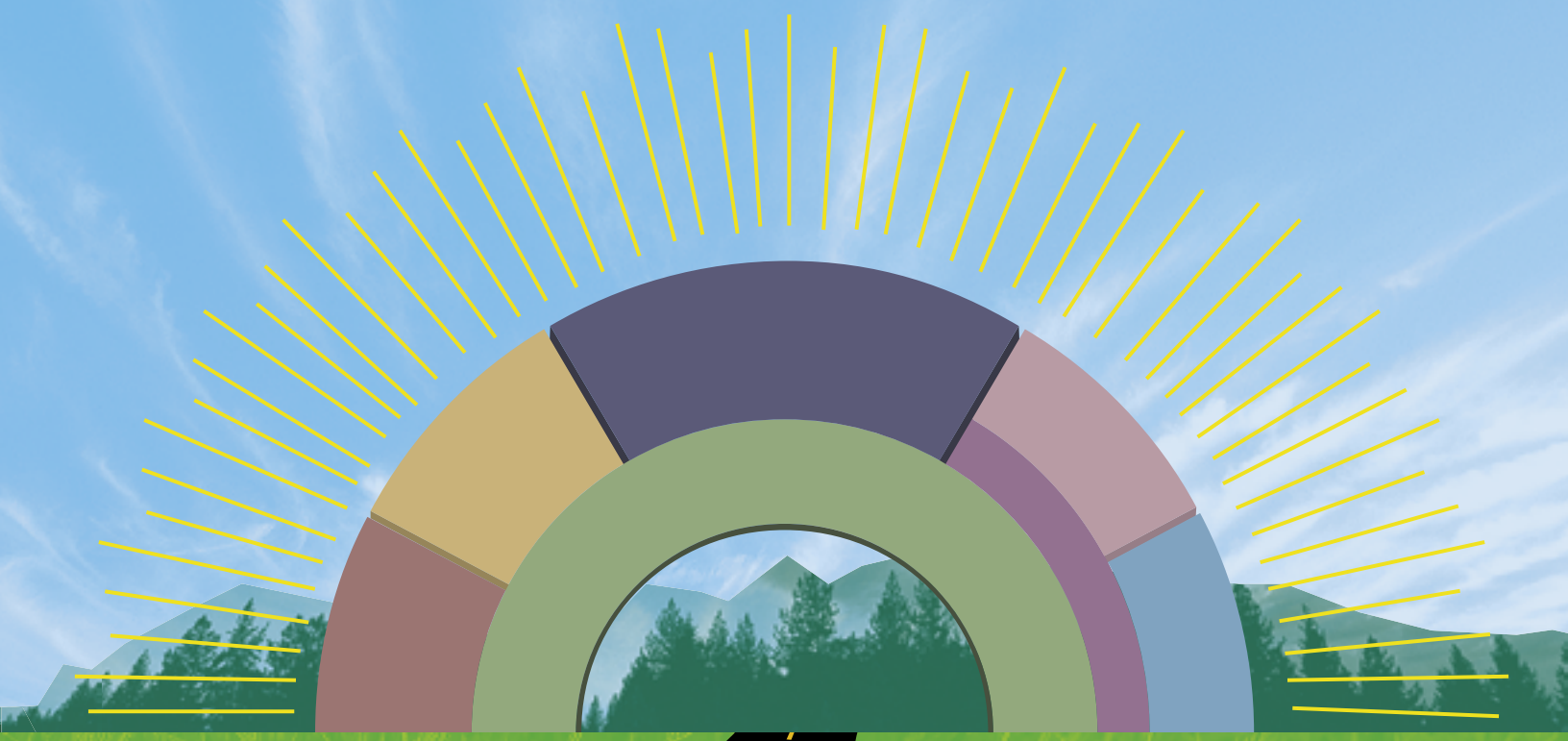
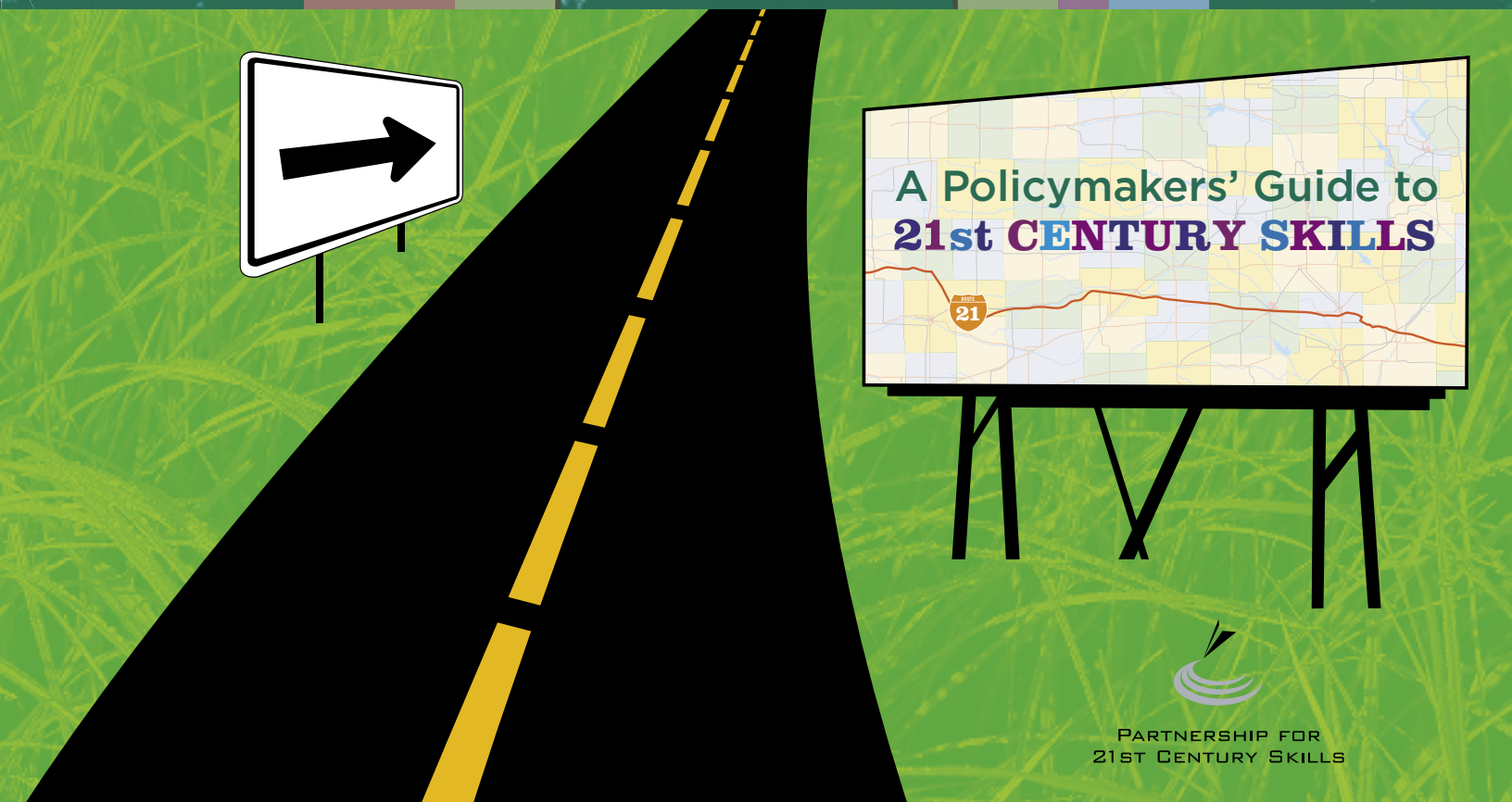
THE road TO 21st CENTURY LEARNING





A Policymakers' Guide to 21st CENTURY SKILLS

Partnership for 21st Century Skills

The Partnership for 21st Century Skills is a unique public-private organization formed in 2002 to create a successful model of learning for this millennium that incorporates 21st century skills into our system of education.

CONTENTS

Key Partners
U.S. Department of Education
Appalachian Technology in Education Consortium

Strategic Partners
American Association of School Librarians (AASL)
Consortium for School Networking (CoSN)
International Society for Technology in Education (ISTE)
National 4-H Council
State Educational Technology Directors Association (SETDA)
TECH CORPS

Participating Organizations
Corporation for Public Broadcasting (CPB)
GCI
Learning.com
FutureKids
Pitsco, Inc.

A CALL TO ACTION

What would happen if Americans were once again as united in their solidarity for public education as they are about the ideals of freedom, democracy and the entrepreneurial spirit? What if the passion of American optimism and renewal penetrated K-12 schools? What if education were recognized as the clear path to achievement and success in every American community?

State policymakers today have an opportunity—and an obligation—to move forward with a new direction for teaching and learning in the 21st century. Armed with the guidance and recommendations in this report, state policymakers can begin to evaluate their existing standards, curricula and assessments and refine them to address the new demands for 21st century skills. By doing so, states can create a lasting legacy of educational achievement—and fulfill their obligation as stewards of future generations of successful students, citizens and workers. The opportunity is three-fold:

- **A growing sense of urgency about the future of America.** There is a growing sense of urgency that the nation must act now to ensure that future generations of Americans can participate fully in the democratic process and the competitive global economy. Education is the foundation of democratic institutions, national security, economic growth and prosperity—and Americans cannot be complacent about improving the quality of education while competitors around the world are focusing on preparing students for the demands of this century. Only recently, the National Science Board, a federal advisory panel established by Congress, warned that the United States faces a major shortage of scientists because too few Americans are entering technical fields and because of the burgeoning ranks of highly competent scientists in other nations.

America risks losing its long-standing preeminence in science, engineering, technology, medicine, defense, business and even democracy. Without many more highly educated, highly skilled young people to carry the torch of inquiry, innovation and enterprise into the future, American dominance in these and other endeavors may fade.

- **Broad consensus that there must be significant improvement in schools.** There is broad consensus among educators, policymakers, business leaders and the public that schools today must do a better job of preparing young people for the challenges and expectations of communities, workplaces and higher education. Moreover, there is broad consensus about the knowledge and skills that are essential in the world today—and about the educational model that would make schools more relevant to the world again as well. This model emphasizes that students today need 21st century skills to guarantee America's success tomorrow.

- **An opportunity created by the No Child Left Behind Act.** The No Child Left Behind Act of 2001, which reauthorizes the Elementary and Secondary Education Act of 1965, recognizes the urgency of improving public education. The federal law emphasizes student achievement and requires assessments in core subjects. Further, it requires students to be proficient in technology literacy by the eighth grade. Responding aggressively to this requirement with visionary policies will enable students to achieve the core competencies measured by No Child Left Behind.

  The Partnership for 21st Century Skills, a unique public-private collaboration of leading business, education and government groups, believes that states can use the convergence of nationwide urgency, public and private consensus, and the federal requirements to craft visionary state education policies. Such policies would integrate a suite of 21st century knowledge and skills into education. The six key elements of 21st century learning include:

  - Core subjects
  - Learning skills
  - 21st century tools
  - 21st century context
  - 21st century content
  - 21st century assessments

See page 11 for definitions of these six key elements.

> **"The Partnership has brought together educators, administrators, parents, business and community leaders, and others to build a consensus on the definition of 21st century skills."**
>
> **U.S. Secretary of Education Rod Paige**

The starting point for paving this bold path in education is to infuse existing standards for core academic subjects and assessments with the learning skills and 21st century tools, context and content that should be emphasized more in most schools today. This powerful combination of knowledge and 21st century skills will offer all students the opportunity for a more meaningful and relevant educational experience.

To realize this opportunity, the Partnership recommends that states take these steps, starting now:

1. Adopt state standards that incorporate 21st century tools and learning skills as part of the No Child Left Behind eighth-grade technology literacy requirement.
2. In addition to the technology literacy requirement, embed ICT (information and communication technologies) literacy into current standards, curricula and assessments for core subjects.
3. Create state and local infrastructure that supports a 21st century education.
4. Provide professional development that is strategically aligned to support the goal of offering a 21st century education to all students.
5. Engage educators, employers, parents and policymakers in an ongoing dialogue that provides recommendations and advice about 21st century education.

ROUTE 21: AN INTERACTIVE GUIDE

In addition to this policy paper, more detailed information on implementing 21st century skills is available in *Route 21: An Interactive Guide*, **which includes highlighted examples, resources, recommendations, tools and self-assessments for:**

- **Vision Setting**
- **Alignment with Educational Goals**
- **Self-Assessment**
- **ICT Literacy**
- **Professional Development**
- **Equitable Access**
- **21st Century Assessment**
- **Collaboration**
- **Capacity Building**

To use Route 21, go to:
www.21stcenturyskills.org/route21/

A COMMON COURSE OF ACTION FOR ACADEMIC, CIVIC AND ECONOMIC DEMANDS

To understand the compelling need for visionary action in integrating 21st century skills into education, state policymakers need look no further than their own most pressing academic, civic and economic priorities. Consider the realities states face today:

- **Academic and student expectations are rising.** States are accountable to the public and private sectors, as well as to the federal government under the provisions of No Child Left Behind, to raise student achievement in core academic subjects. This is an urgent priority for many constituencies. Despite increased state focus on higher academic standards, more rigorous curricula and accountability assessments, students are not keeping pace with the rising expectations of parents, policymakers, employers and higher education.

Incremental improvement isn't enough. Integrating 21st century skills into K–12 education will empower students to learn and achieve in the core academic subjects at much higher levels. These skills, in fact, are the learning results that demonstrate that students are ready for the world.

Moreover, there is evidence that 21st century learning experiences translate into higher test scores. Research by the Learning Technology Center at the University of Texas at Austin, for example, showed that students involved in rich, 21st century learning experiences that included cooperative learning and knowledge construction in English and social science instruction scored at least as well as comparable students on some tests—and significantly better on others. The National Assessment of Educational Progress found that students involved in active learning in civics classes, such as mock trials or simulated congressional hearings, tended to perform higher on assessments of knowledge of civics than did students whose lessons were limited mostly to passive reception of knowledge through lectures and textbooks. In recent research by D.J. Leu published by the International Reading Association and in the *Handbook of Reading Research* shows a consistent increase in motivation among students when Internet and other technologies were used in classrooms. And increases in motivation were almost always associated with increases in learning.

Meanwhile, student expectations for their academic learning are rising as well. Incorporating 21st century skills into education will make learning as relevant and invigorating in school as it is in their lives outside of school, where many students already use the latest technologies to communicate, collaborate, work and learn. Many students already learn and process information in very different ways than people used to—multitasking, interacting and researching topics and issues they care about with digital tools they have at their fingertips.

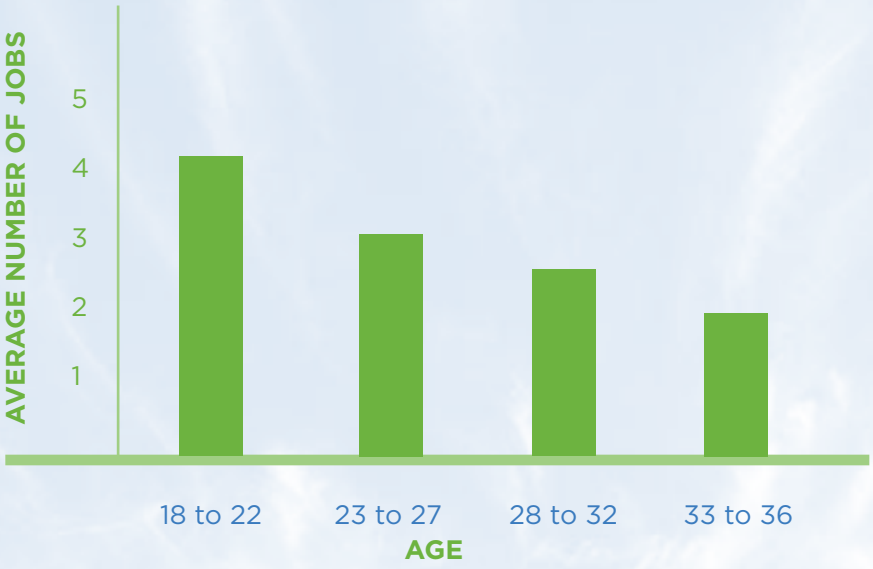
Yet even these skills are merely the minimum levels of functioning in the 21st century. Using technology to communicate, for example, is not the same as mastering the skills of effective communication. Students need to learn how to use technology intelligently, creatively and ethically to accomplish intellectual pursuits. To thrive in the world today, students need higher-end skills, such as the ability to communicate effectively beyond their peer groups, analyze complex information from multiple sources, write or present well-reasoned arguments about nuanced issues and develop solutions to interdisciplinary problems that have no one right answer. In this light, technology is not a panacea for education, but a powerful springboard to higher-level learning.

Students themselves recognize the essential place of technology in their education. A 2004 survey from the Pew Foundation's Internet & American Life Project, for example, confirmed that students now rely heavily on the Internet to help them do their schoolwork. But many of the most tech-savvy teens complain that the resources and teaching aids available on the Web are not well understood or well used in most classrooms. Indeed, the majority of educational Web use by teen-aged students occurs outside of the classroom. Further, recent findings from the BellSouth Foundation's Power to Teach Program indicate that while teachers believe they are getting better at integrating technology into education and making assignments more engaging, students see little change in classroom practices.

"Education is the single most important investment we can make in our nation's future. The world is becoming more competitive and complicated than ever before, and we need to give our young people the knowledge and skills they need to meet the challenges and opportunities of tomorrow."

Iowa Governor Tom Vilsack

FOR YOUNG PEOPLE, CHANGES ARE THE NORM



Source: U.S. Bureau of Labor Statistics, National Longitudinal Survey of Youth, 1979, from 2000 interviews

At the same time, students without access to technology at home are the victims of a widening digital divide, unable to practice the learning skills that are increasingly valued in the world today.

Schools can support higher achievement for all students by making academic inquiry absorbing, rewarding and relevant to students' lives. Schoolwork this engaging would capture the attention of the many disaffected and disenchanted students, whose lack of interest drags down student performance.

- **Civic life and personal choices are more complex.** To manage their personal affairs effectively and contribute fully to their communities, the nation and the world, people need 21st century skills.

  In their personal lives, for example, people need to make health care, career and financial choices that profoundly affect their quality of life. They will need to stay well informed about developments in health care and preventive care and be prepared to understand their medical options. People need to be able to access information efficiently, sift through conflicting reports and make sensible choices about complicated issues that arise every day.

  Communities, states and the nation need citizens who are capable of meeting the rights and responsibilities of civic life. For example, citizens may need to understand the scientific, environmental and tax implications of a local or state bond referendum to preserve a natural habitat. Further,

people increasingly need to know more about the world beyond their back yards. Parochial thinking will not help people understand the exploration of Mars, sociopolitical conflicts or structural changes in the economy. To understand the global geopolitical issues that make headlines requires a deep grounding in history, geography and science, along with new content for the 21st century—global awareness, financial, economic and business literacy, and civic literacy.

Increasingly, personal effectiveness and civic participation require an understanding of and proficiency with technology. From finding advice on parenting and retirement plans to paying taxes and parking tickets to participating in public forums, competence with 21st century skills is a new basic.

All of these rights and responsibilities are becoming increasingly sophisticated—especially in an era when both the public and private sectors are turning over more life-management choices and decision-making power to individuals. All Americans need 21st century skills to handle 21st century realities.

- **Economic demands are making workplaces more competitive.** Americans need a rigorous education that includes both core academic subjects and 21st century skills, both to weather economic changes they cannot control and to take charge of their own lives by transitioning from job to job—and career to career—successfully. In an ever-changing global economy, baby boomers born from 1957 to 1964 held nearly 10 jobs between the ages 18 to 36, according to a 2002 report from the U.S. Bureau of Labor Statistics.

Skill demands have been rising consistently for many years as well—and there is every indication that this trend will continue for the foreseeable future. Further, opportunities for unskilled workers continue to decline. "The disappearance of clerical and blue-collar jobs from the lower middle of the pay distribution illustrates this pattern of limited job options," write Frank Levy and Richard Murnane in their 2004 book, *The New Division of Labor: How Computers Are Creating the Next Job Market*. "People with sufficient workplace skills can move from these jobs into one of the expanding sets of higher-wage jobs. People who lack the right skills drop down to compete with unskilled workers at declining wages."

"Integrating 21st century skills into K–12 education empowers students to learn and achieve at the level necessary to succeed in this century. Education will become both more invigorating and relevant when it reflects the realities and challenges of contemporary life."

John Wilson, executive director of the National Education Association

WHY STUDENTS NEED 21ST CENTURY SKILLS

	20th Century	21st Century
Average Number of Jobs Most People Hold in a Lifetime	**One or two**	**10 to 15**
Academic, Civic and Economic Expectations	**Mastery of one field**	**Flexibility and adaptability**
Teaching Model	**Subject matter mastery**	**Integration of 21st century skills into subject matter mastery**
Assessment Model	**Standardized tests based on mastery of facts**	**Authentic, structured, iterative demonstrations of student understanding**

Many Americans are not prepared to succeed in this environment. Indeed, as Levy and Murnane point out, economic security increasingly requires high-level skills: "Computerization has altered the tasks that American workers perform in their jobs. Declining portions of the labor force are engaged in jobs that consist primarily of routine cognitive work and routine manual work—the types of tasks that are easiest to program computers to do. Growing proportions of the nation's labor force are engaged in jobs that emphasize expert thinking or complex communication—tasks that computers cannot do."

Meanwhile, technology companies charge that the failure of U.S. schools to produce enough graduates with higher-level math and science skills is one reason they are hiring workers in other countries, according to a 2004 report by the Computer Systems Policy Project. Workplace competition no longer means vying against a colleague down the hall: Today, the competition is international.

It is a rarity in public life that a common course of action can address many public priorities. By acting now to integrate 21st century skills into education, state policymakers can respond to the urgent academic, civic and economic demands for better-educated Americans. Fostering a renewal in education is the best way states can respond to the challenging and changing circumstances of the 21st century.

OUR VISION FOR A RENEWAL IN EDUCATION

State policymakers are familiar with the problems in education. Despite our best efforts to date, we still struggle to improve performance for all students, to reduce dropout rates and to make technology available to all students, regardless of their economic backgrounds.

Integrating 21st century skills into education will make a tremendous difference in addressing these problems. Imagine:

- A place where all children master rigorous core academic subjects
- A place where teaching and learning are relevant to life outside of school
- A place where all children understand and use the learning skills—information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills—that lead to high performance in school and in life
- A place where vital new academic content is part of the common core curriculum
- A place where professional development and teaching strategies enable educators to help students gain the knowledge and skills they need
- A place where every student, teacher and administrator has on-demand access to 21st century tools and technologies and uses them to work productively
- A place where 21st century tools and context are embedded in core subjects and assessments
- A place where all students—including those with learning or physical disabilities and those who are learning English—can show what they know and can do with all of the knowledge and skills that are valued in the world

This is our vision for a bold new direction in schools throughout the country. Schools like these would be intellectually stimulating environments for students, teachers and administrators alike. Communities, employers, colleges and universities would be proud to welcome

The Partnership's first report, *Learning for the 21st Century*, is available on our website, www.21stcenturyskills.org.

graduates of 21st century schools as the best prepared generation of citizens in American history. Reaching this vision is both important and possible—and it rests in the hands of policymakers today.

A POWERFUL FRAMEWORK FOR LEARNING

Some states and school districts already have begun the work of incorporating technology literacy into their K–12 education requirements. They are moving in the right direction—but the Partnership for 21st Century Skills strongly believes that states need to think much bigger and go much further to prepare young people adequately for the future. *Eighth-grade technology literacy is just a starting point—and a crucial way to get to the other high-level knowledge and skills essential for the 21st century.*

In our 2003 report, *Learning for the 21st Century: A Report and MILE Guide for 21st Century Skills*, we articulated a compelling vision and common framework for education. We collaborated with the education, business and policymaking communities and validated our recommendations with a broad outreach effort to individuals and groups, including education experts, teachers, students, businesses, community groups, university faculty and researchers, representatives from underserved communities and after-school programs, and policymakers. Our work truly represents a collective consensus about the knowledge and skills Americans need to prosper today and tomorrow—and the way to make it happen.

While we believe students should begin learning 21st century knowledge and skills in preschool and continue to update them throughout their lives, the Partnership is focusing on K–12 education.

SNAPSHOTS OF SUCCESS AT THE SCHOOL, DISTRICT AND STATE LEVELS

Since we released our recommendations in 2003, we have returned to states and communities around the country to gauge their progress in preparing young people to succeed and prosper. While every state, school district and school still has more to accomplish, many are laying the foundation for a 21st century education—and achieving results. They can serve as beacons to those who are ready to move forward with this urgent agenda. Following is a sampling of what is possible at the school, district and state levels to embed ICT literacy into daily educational practices, with Web links available for those who want to learn more:

At the School Level

INFUSING ICT LITERACY INTO A SCHOOL CULTURE Anderson New Technology High School in rural Anderson, Calif., which has fewer than 200 students, has set these guiding principles that exemplify how ICT literacy can be integrated throughout the educational process:

- **How we teach**: We don't cover material, we uncover solutions, together. Our curriculum is problem- and project-based. We freely integrate our projects among disciplines and within the community. We prepare our students to succeed at the university level.

In Learning for the 21st Century, the Partnership recommended a research-based education model that incorporates these six key elements of 21st century learning:

SIX KEY ELEMENTS OF 21st CENTURY LEARNING

1 CORE SUBJECTS

No Child Left Behind identifies these as English, reading or language arts; mathematics; science; foreign languages; civics; government; economics; arts; history; and geography. We believe the focus on core subjects must expand beyond basic competency to the understanding of core academic content at much higher levels.

2 LEARNING SKILLS

Learning skills comprise three broad categories:

- Information and communication skills
  - Information and media literacy
  - Communication skills
- Thinking and problem-solving skills
  - Critical thinking and systems thinking
  - Problem identification, formulation and solution
  - Creativity and intellectual curiosity
- Interpersonal and self-directional skills
  - Interpersonal and collaborative skills
  - Self-direction
  - Accountability and adaptability
  - Social responsibility

3 21st CENTURY TOOLS

In a digital world, students need to learn to use the tools to master the learning skills that are essential to everyday life and workplace productivity. This proficiency is known as ICT (information and communication technologies) literacy, defined by the Programme for International Student Assessment as "the interest, attitude and ability of individuals to appropriately use digital technology and communication tools to access, manage, integrate and evaluate information; construct new knowledge; and communicate with others in order to participate effectively in society." This definition goes far beyond a narrow technical competency, which is a relatively low-level skill, to including higher-level skills, critical thinking and intelligent, creative and ethical use of technology.

4 21st CENTURY CONTEXT

Students need to learn academic content through real-world examples, applications and experiences both inside and outside of school. Students are better learners when education is relevant, engaging and meaningful to their lives—they understand subjects better and retain more information. Studying the implications of the SARS epidemic, for example, makes biology come to life. Learning skills also need to be taught in a 21st century context. For example, we need to be able to communicate and collaborate in a modern context using 21st century tools.

5 21st CENTURY CONTENT

Education and business leaders identified three significant, emerging content areas that are critical to success in communities and workplaces:

- Global awareness
- Financial, economic and business literacy
- Civic literacy

6 21st CENTURY ASSESSMENTS

States and districts need high-quality assessments that measure students' performance of the elements of a 21st century education. Standardized tests alone can measure only a few of the important skills and knowledge students should learn. A balance of assessments—that is, high-quality standardized testing for accountability purposes and classroom assessments for improved teaching and learning in the classroom—offers students a powerful way to master the content and skills central to success in the 21st century.

- **What we teach**: Our students know what to do when they don't know what to do. Besides mastering the traditional curriculum, they understand process, leadership, innovation, relationships, motivation, follow-through, perspective and know-how to make a decision.
- **Where we teach**: Our school is a network. Everybody is a part of the network. Every connection is vital. It is both flexible and supportive, and extends beyond our campus into our homes and communities.
- **How we collaborate**: Working together sets us apart. Students who feel uncomfortable at traditional high schools often find a place here. Our size and our emphasis on teamwork and collaboration help foster a safe and supportive environment.
- **How we lead**: We treat our students as partners, not subordinates. We let them peek behind the green curtain—in fact, sometimes we let them pull the levers. Our shared leadership model affects consensus and ownership.
- **How we think**: Questions are often more important than answers. Our students interpret and connect, evaluate and justify, and learn to think on their own.

The high school's curriculum reflects this 21st century approach to education. Students take courses in traditional core subjects and can select courses in business ventures, digital media, computer-assisted design, global studies, imaging, leadership, and TV/video.
www.anths.org

At the District Level

USING 21ST CENTURY TOOLS AND CONTEXTS TO IMPROVE CORE SUBJECT RESULTS

- Community Consolidated School District 15, a 12,390-student, K–8 district in suburban Chicago, made comprehensive changes to its system to achieve measurable results, which exemplify the use of 21st century tools and contexts to improve student achievement in core subjects.

  District 15 implemented intensive reading intervention programs in kindergarten, first and second grades and reading acceleration programs for older students, including one that combines technology with print materials. As a result, 84 percent of the district's second graders were reading at or above grade level in 2002–03, an improvement of approximately 10 percentage points since 2000–01 and nearly 35 percentage points

> **"Information and communication literacy is redefining what we mean by basic literacy beyond reading and math skills to include critical thinking, problem solving and creativity."**
>
> **Michael Dell, chairman and CEO of Dell, Inc.**

above the national average. The rates at which special education students and English language learners are meeting performance goals exceed national and state comparisons.

Science instruction in District 15 is enhanced by the use of a "space shuttle"—a converted school bus, mission control simulations, a Discovery Learning Center for earth science and geology, and involvement in actual space shuttle missions. Since 1996, junior high students with learning disabilities have participated in a competition at the NASA Space Camp in Huntsville, Ala., against non-disabled and gifted students from throughout the nation. During these seven years, District 15 students have finished first in at least one of four competition areas.

For its achievements, District 15 earned the Malcolm Baldrige National Quality Award in 2003.
www.nist.gov/public_affairs/releases/district15.htm

At the State Level

MEASURING 21ST CENTURY SKILLS AND USING 21ST CENTURY ASSESSMENTS

- **Nebraska** has persuaded federal education officials to approve the nation's most innovative assessment system, which allows school districts to use portfolios to measure student progress. This approach to assessment exemplifies the use of new assessment tools to measure 21st century knowledge and skills.

  Nebraska's 517 school districts design their own assessment systems: a portfolio of teachers' classroom assessments, district tests that measure how well children are meeting locally developed learning standards, a state writing test and at least one nationally standardized test to serve as a reality check. Federal education officials said Nebraska's system passed muster because the state's constitution guarantees local control over school accountability and the state was able to demonstrate that the assessments were valid and reliable.
  www.nde.state.ne.us

- **Virginia** is currently doing 400,000 high-stakes tests online out of 800,000 end-of-course tests. Online testing enables the state to get results quickly and accurately—and students say they prefer online tests to pencil-and-paper testing.
  www.pen.k12.va.us

- The Center for Children and Technology (CCT) has found that handheld personal digital assistants can be valuable tools to support student assessment. CCT has been evaluating **New Mexico** teachers' use of handhelds to administer a literacy assessment and diagnostic test to students in that state's Reading First schools. Their findings show gains in efficiency in the time required to administer assessments, as well as greater accuracy of administration and faster turnaround of results.

  Greater efficiency can be the determining factor in whether teachers choose to adopt a new tool in their regular teaching practice. With the immediacy of the data being collected by teachers comes a heightened awareness that there is a direct connection between teachers'

classroom activities and students' performance on assessments. The loop between assessment and instruction is tightened. http://164.64.166.11/cilt/CILT/programs/readingfirst/main.html

ILLUSTRATING THE INTEGRATION OF 21ST CENTURY SKILLS INTO CORE SUBJECTS

The Partnership also has forged alliances with many organizations that represent the core academic subject areas. We are working closely with these organizations to articulate how students can:

- Use 21st century tools in every grade to learn core subjects and 21st century content
- Acquire ICT literacy by performing learning skills with 21st century tools in every class
- Meet the eighth-grade technology literacy requirement in every core subject
- Demonstrate 21st century skills on assessments that are appropriate to the tasks

Following are examples of how schools are integrating 21st century skills into core subjects—and supporting teachers in making the transition to 21st century teaching and learning. In many of these examples, there is a clear and fitting trend toward mastering competencies, not just content, for the 21st century. Students need to learn *how* to learn new content continually in a world where knowledge and information continue to change.

Bringing English Language Arts and Social Studies to Life With Digital Tools and Learning Skills

- In New York City, Bronx Borough President Adolfo Carrión Jr. provided schools with laptops, camcorders and a challenge to create the best public service announcement or local documentary about their community. Students in grades five through 12 will research, direct and produce their own videos examining local issues or historical events while focusing on social studies and language arts requirements.

  Over the next two years, 40 schools will create digital documentaries of their neighborhoods. Through filmmaking, students will acquire an understanding of the power of good questions and higher-level thinking. The program also will be emphasizing skills that students need in all subject areas—literacy, content analysis, communication and perseverance. The project exemplifies the Partnership's vision of using 21st century tools to learn core subjects in a 21st century context and to acquire learning skills. Moreover, the power of the "fun factor" to make learning relevant cannot be denied.

  The project, known as Digital Documentaries, is supported by Power to Learn and the Independent Film Channel. www.atschool.org/digidocs/index.htm

A SAMPLE FROM THE ICT LITERACY MAP FOR GEOGRAPHY

This sample from a content map for geography shows how schools can combine learning skills—in this sample, information and media literacy—with 21st century tools to achieve progressively more challenging learning results. This map was developed in collaboration with the Geographic Education National Implementation Project, a consortium of organizations that promotes geography education.

The Partnership is developing original ICT Literacy Maps that show how ICT literacy can be incorporated in the content areas. These maps are available on our website at www.21stcenturyskills.org/matrices/

LEARNING SKILLS

CRITICAL THINKING AND SYSTEMS THINKING

- **Exercising sound reasoning**
- **Making complex choices**
- **Understanding the interconnections among systems**

21st CENTURY TOOLS

- **graphs**
- **maps**
- **geographic information systems**
- **remote sensing (aerial photographs, satellite images)**
- **newspapers**
- **books**
- **computers**
- **Internet**
- **television**
- **database and spreadsheet software**
- **digital libraries**
- **presentation devices**
- **LCD projection device**
- **"smart" whiteboards**

SAMPLE STUDENT OUTCOMES

BY GRADE 4, STUDENTS WILL BE ABLE TO:

- **Use information gathered from newspapers, television and the Internet to describe how weather and climate influence activities in the students' region on a daily, seasonal, and permanent basis.**
- **Map and analyze the spatial aspects of routes to and from school and choose most desirable and safe way to school**
- **Describe the relationship between population growth and air pollution by interpreting a graph displaying information on both topics**

BY GRADE 8, STUDENTS WILL BE ABLE TO:

- **Use a geographic information system to compare alternative sites in order to identify the best location for a new park according to defined criteria**
- **Develop innovative plans, including specific recommendations illustrated by maps, to improve the quality of environments in large cities, weighing the benefits and drawbacks of each plan**
- **Use a spreadsheet program to compare data, collected from digital libraries, about cities in the developing world. Specific tasks may include investigating the relationships among political, social and environmental change**

BY GRADE 12, STUDENTS WILL BE ABLE TO:

- **Use the Internet and digital libraries, identify and compare alternative, sustainable economic activities in regions of significant resource depletion**
- **Use a geographic information system to identify physical environments that impose limits on population growth, such as water scarcity in southern California**
- **Use remote sensing (aerial photographs and satellite imagery) to explore and analyze environmental change such as deforestation in a given region**

Source: Geographic Education National Implementation Project

- A similar project is under way through the Appalachia Media Institute, which is helping young people in rural Central Appalachia, Ky., learn filmmaking as a way to develop technical, critical and civic engagement skills. www.appalshop.org/ami

A Geographic Journey Builds Learning Skills in a 21st Century Context

- High school geography students in teacher Fred Walk's classrooms in Normal, Ill., preserved an abandoned 2.5-mile stretch of historic highway as part of a classroom project called *Historic Route 66: A Geographic Journey*. The students collected oral histories from people who had made their living from old Route 66, then used computer software programs to document their findings; organize and analyze information; and create pamphlets, maps, murals and historical placards.

  They then engaged in real-world problem solving to convince the Illinois Department of Transportation to preserve a historic bridge along the highway. The students' Save the Bridge campaign strategies included writing letters to the local newspaper, contacting local TV stations, developing a petition and collecting more than 1,000 signatures. As a result, public officials pledged to save the bridge as a pedestrian walkway for future generations. www.unit5.org/nchs/

Integrating ICT into Math and Science

- A semester-long project to boost high school math scores for freshmen algebra students with low-level math skills has resulted in increased scores for them—and paid dividends for third graders as well.

  The project at Lawrence North High School in Indiana required students to reinforce their math skills by examining the problem-solving process, reading elementary picture books with math themes, creating math dictionaries for third graders and working with third graders on math problem solving. The project is part of the Lawrence Township School District's digital age literacy initiative.

  Pre- and post-testing—using old tests from Indiana's Statewide Testing for Educational Progress—showed a 22.9 percent increase in scores for the high school students. lawrencenorth.ltschools.org/

- At Avery Middle School in Somers, Conn., students learn math at the amusement park. Students use ICT literacy skills to plan a one-week trip to the park with their families, researching local parks and hotels, developing budgets, mapping travel directions and presenting their findings in words, graphs and charts. A lesson plan is available online. www.somers.k12.ct.us/staff_department/luginbuhlm/home.html.

Making Music—and Acquiring 21st Century Skills—With Technology

- At Bay Shore High School in New York, technology labs are called "a powerful, flexible tool for the creative process" in a district known for excellence in its music program. Students at Bay Shore use MIDI (musical instrument digital interface) technology to compose music and create multimedia videos, CDs and DVDs for core subject classes and school promotions.

These projects foster creative thinking and project management skills, while music training and performance improve students' presentation and teamwork skills. These are the kinds of learning skills acquired by using 21st century tools that the arts make possible and that the Partnership advocates.

Music is a core subject at Bay Shore. The school's music program is one of the top 100 in the nation, according to the American Music Conference.
www.bayshore.k12.ny.us

Integrating ICT Into Professional Development

- The California Technology Assistance Project (CTAP2), an online, data collection and reporting tool, allows county, district and school administrators to gather information on their staff's technology proficiency and use of technology to support the teaching and learning process. CTAP2 contains a technology proficiency self-assessment instrument and a technology use survey instrument. The self-assessment is based upon rubrics established in alignment with the California Commission on Teacher Credentialing (CTC) technology standard for a preliminary K-12 teaching credential.
www.ctap2w1.iassessment.org

Maine School Administrative District 5 in Rockland used the State Educational Technology Directors Association National Leadership Institute 2003 Toolkit to develop its technology plan. Elements of the district's plan include:

- Professional development
- Strategies for improving academic achievement and teacher effectiveness
- Innovative delivery strategies
- Integration of technology with curricula, instruction and assessment

www.msad5.org

- Gadsden Independent School District in New Mexico has adopted an Educational Plan for Student Success, which features a project to align professional development and curricula to connect teaching, learning and assessment through the use of technology. The plan was developed through a collaborative process that involved community and parent participation.
www.gisd.k12.nm.us/techplan/

"I think if you get more technology at school, the students would learn more."

A sixth grader from Whitestone, N.Y., NetDay's National Report on Speak Up Day 2003, Voices and Views of Today's Tech-Savvy Students

RECOMMENDATIONS FOR POLICYMAKERS

It will take a concerted, comprehensive commitment and action from state policymakers to lead the way for launching a new direction in education. States still have a long way to go in integrating 21st century skills into curriculum and instruction. A recent *Education Week* report shows that all but six states include technology requirements in their state academic standards, but only three states—New York, North Carolina and Utah—actually test student knowledge of technology to see if the instruction is having an impact. Most states have not yet systematically integrated ICT literacy into education—and in some places, lack of technology access remains a huge barrier to 21st century learning.

In this light, the Partnership for 21st Century Skills recommends five policy directions for states to follow now:

1. **Adopt state standards that incorporate 21st century tools and learning skills as part of the No Child Left Behind eighth-grade technology literacy requirement.** Standards must encompass more than technology proficiency, which is too narrow a skill for the world today. Instead, students must be competent in ICT literacy—using 21st century tools and learning skills (information and communication skills, thinking and problem-solving skills, and interpersonal and self-directional skills) that will enable them to learn *how* to learn in school and throughout their lives.

Recommendations:

a. The Partnership recommends that state standards for technology literacy should require that every eighth grader be able to use 21st century tools to:
   - Manage, evaluate and create age-appropriate information in a variety of forms and media
   - Understand, manage and create effective communications in a variety of forms and contexts
   - Exercise sound reasoning, make complex choices and understand connections among systems
   - Frame, analyze and solve age-appropriate problems
   - Develop and communicate new ideas and be alert to and respectful of diverse perspectives
   - Demonstrate teamwork and leadership and work productively and collaboratively with others

- Monitor his or her own learning with parents and teachers
- Exercise personal accountability and adaptability in personal, educational and community contexts

b States also should not stop at the eighth-grade requirement. States should plan to establish requirements that articulate 21st century skills expectations for elementary school students and high school graduates.

2. **In addition to the technology literacy requirement, states should embed ICT literacy into current standards, curricula and assessments for core subjects.** States regularly update their standards, curricula and assessments. Every standards review cycle presents an opportunity to incorporate ICT literacy systematically into core curriculum—exactly where it belongs if real improvements in teaching and learning are to occur. Students should be using 21st century technologies and learning skills to learn English, reading and language arts; mathematics; science; foreign languages; civics; government; economics; arts; history; and geography. In doing so, they will prepare themselves to better meet the everyday challenges they will face outside of school.

Recommendations:

a. States should embed ICT literacy (the use of 21st century tools and learning skills) into standards, curricula and assessment for core subjects. (See the Geography Sample from the ICT Literacy Map for Geography on page 15 for an example of this integration. Additional ICT Literacy Maps are available at www.21stcenturyskills.org/matrices/)

b. States must make sure that their assessment systems on both the state and local levels include measures of students' proficiency in ICT literacy. While this may include the use of standardized tests, the teaching and learning of 21st century skills are best accomplished through activities that combine instructional and assessment processes at the classroom level.

"Kids really need to learn to think better and not just learn how to take a test. We're teaching kids how to think rationally, critically and creatively."

Jane Adams, Principal, Scales Elementary School, Tempe, AZ

3. **Create state and local infrastructure that supports a 21st century education.** One of the biggest barriers to 21st century learning may be inadequate access to technology. While most states and school districts have made remarkable progress in installing computers in schools, many still do not have ready access to the Internet or adequate technical support to make access reliable all day, every day. Today, desktop computers in classrooms represent the bare minimum in terms of technology equipment that schools need. Classroom telephones, laptops, wireless technology, scientific devices and video conferencing centers for distance learning are just a few of the tools that can improve and expedite learning.

   Recommendations:

   a. States should measure where they are in developing their infrastructure. Several states, such as Florida, Massachusetts, Tennessee and Texas, have developed their own School Technology and Readiness (StaR) charts, a tool developed by the CEO Forum on Education & Technology that allows states and districts to assess their level of infrastructure. To learn more, refer to these Web sites:
   FLORIDA www.doe.firn.edu/edtech/sr/star/
   MASSACHUSETTS www.doe.mass.edu/boe/sac/edtech/star.html
   TENNESSEE www.state.tn.us/education/acctstar-campus-portrait.doc
   TEXAS www.tea.state.tx.us/technology/etac/campus_txstar/

   b. States should provide 21st century tools that enable administrators and teachers to assist in administrative tasks and data collection—and allow educators to use data to make decisions that improve teaching and learning.

   c. States should provide schools with the needed funding to put this infrastructure in place.

   d. States must be vigilant about equitable access to technology. All students and educators need access to tools that will help them teach and learn. States must pay particular attention to meeting the needs of students who lack access to information technology at home.

4. **Provide professional development that is strategically aligned to support the goal of offering a 21st century education to all students.** Developing policies without developing people to put them into practice will not work. Current teachers, administrators and future teachers alike need to understand their roles and responsibilities in raising student achievement and equipping students to succeed. Many teachers still lack ongoing professional development support needed to fully integrate existing technology into instructional practice. States should support these professionals with sustained, strategic professional development that enables them to incorporate 21st century skills into their standards, curricula and assessments.

   As the Technology Counts 2004 report from *Education Week* points out, there is much that Americans can learn from educators around the world who are tackling professional development as the next frontier in technology. In Europe, the widely lauded "Finnish model" blends technology into the working culture of schools, with ICT literacy development and teacher training

coordinated across all levels of education. And countries such as South Korea, Singapore and Taiwan have adopted technology "master plans" that incorporate teacher training to bolster classroom use of technology.

Recommendations:

a. States must support robust and strategic professional development for all current teachers and the many paraprofessionals who work with students. States must ensure that ICT literacy is embedded in professional development for these front-line educators in all core subjects. The Partnership for 21st Century Skills recommends that at least 30 percent of technology budgets be allocated to ongoing, site-based professional development efforts that focus on integrating 21st century tools and learning skills into the core curriculum. Further, professional development spending to improve teaching and learning in the core disciplines should include training in ICT literacy.

b. States should support professional development in ICT literacy for all education leaders, from district administrators and their staff to technology specialists and curriculum developers to school principals and coaches.

c. States should make sure that all future teachers in pre-service college and university undergraduate education programs are ICT literate by the time they graduate. By 2007, ICT literacy should be embedded in all core subjects in higher education, especially for education majors. Further, technology use and competence among students and faculty should be as pervasive in schools of education

RESOURCES ON PROFESSIONAL DEVELOPMENT

States should look at the professional development recommendations created by different organizations when funding and creating state professional development programs. Resources to consider:

- **The State Educational Technology Directors Association's essential questions for professional development for designing and implementing professional development programs. To learn more, visit www.setda.org/toolkit2003/hqpd/hqpd3.htm.**
- **The National Council for Accreditation of Teacher Education (NCATE) has standards for schools of professional development. To learn more, visit www.ncate.org/2000/pdsstands_10-00.pdf.**
- **The National Staff Development Council works to provide professional development that promotes student success. To learn more, visit www.nsdc.org.**

"To move a child to the 21st century, we need support. We don't have computers. I'm still working with chalk and a blackboard. We're still operating in the dark ages."

An English teacher in the District of Columbia Public Schools at a Partnership focus group

as in schools of math, science and engineering in higher education. In addition, states also should require evidence of 21st century skills mastery as part of state certification and licensure of teachers.

5. **Engage educators, employers, community members, parents and policymakers in an ongoing dialogue that provides recommendations and advice about 21st century education.** In the fast-paced, ever-changing world, states must be poised to respond to new realities and new demands for education. By bringing together key stakeholders on a regular basis, states can establish a "sounding board" that will enable them to keep education nimble and up to date.

Recommendations:

a. States should renew collaborations with federal, local and business partners to advocate for ongoing support for technology infrastructure, access and professional development, such as the federal e-rate and school construction funding.
b. State and district policymakers should conduct regular reality checks and fact-finding missions into schools to find out if up-to-date technology is available, accessible and useful to teachers and students in their everyday teaching and learning.
c. States, community organizations and businesses should work together to provide opportunities for educators and students to get out of schools to experience the use of technology and learning skills in the community.

"We cannot afford to leave education and training behind in the technology revolution. But, unless something changes, the gap between technology's potential and its use in education and training will only grow as technological change accelerates in the years ahead."

Phillip Bond, U.S. Department of Commerce undersecretary for technology

10 QUESTIONS FOR POLICYMAKERS

What does success look like? Here are 10 questions that state policymakers can ask themselves to find out if they are on the right track:

To explore these questions online, refer to the Partnership's new interactive guide, available at www.21stcenturyskills.org/route21/

STANDARDS AND ASSESSMENTS

1. **Have you expanded your definition of student achievement to include mastery of 21st century skills?**
2. **Have you integrated 21st century skills into your technology literacy requirement for eighth graders?**
3. **Are you taking advantage of your standards revision process to integrate 21st century skills into statewide and district-wide core subject curricula and standards?**
4. **Are all districts and schools evaluated on student achievement in the use of 21st century skills?**
5. **Do student assessments, especially at the classroom and school levels, align with updated standards and measure the attainment of 21st century skills?**

EQUITY AND PROFESSIONAL DEVELOPMENT

6. **Have you provided funding for equitable access for all students to the 21st century tools, teachers and schools they need for success?**
7. **Have you provided funding for equitable access and professional development that integrates 21st century skills into educational practice for teachers, paraprofessionals and administrators?**
8. **Do teacher education programs, statewide licensure of teachers and administrators, and after-school programs require evidence of 21st century skills mastery?**
9. **Do all statewide and district-wide administrators use 21st century tools to handle administrative tasks and make data-driven decisions?**
10. **Do you actively use and promote the use of 21st century tools in your state or community?**

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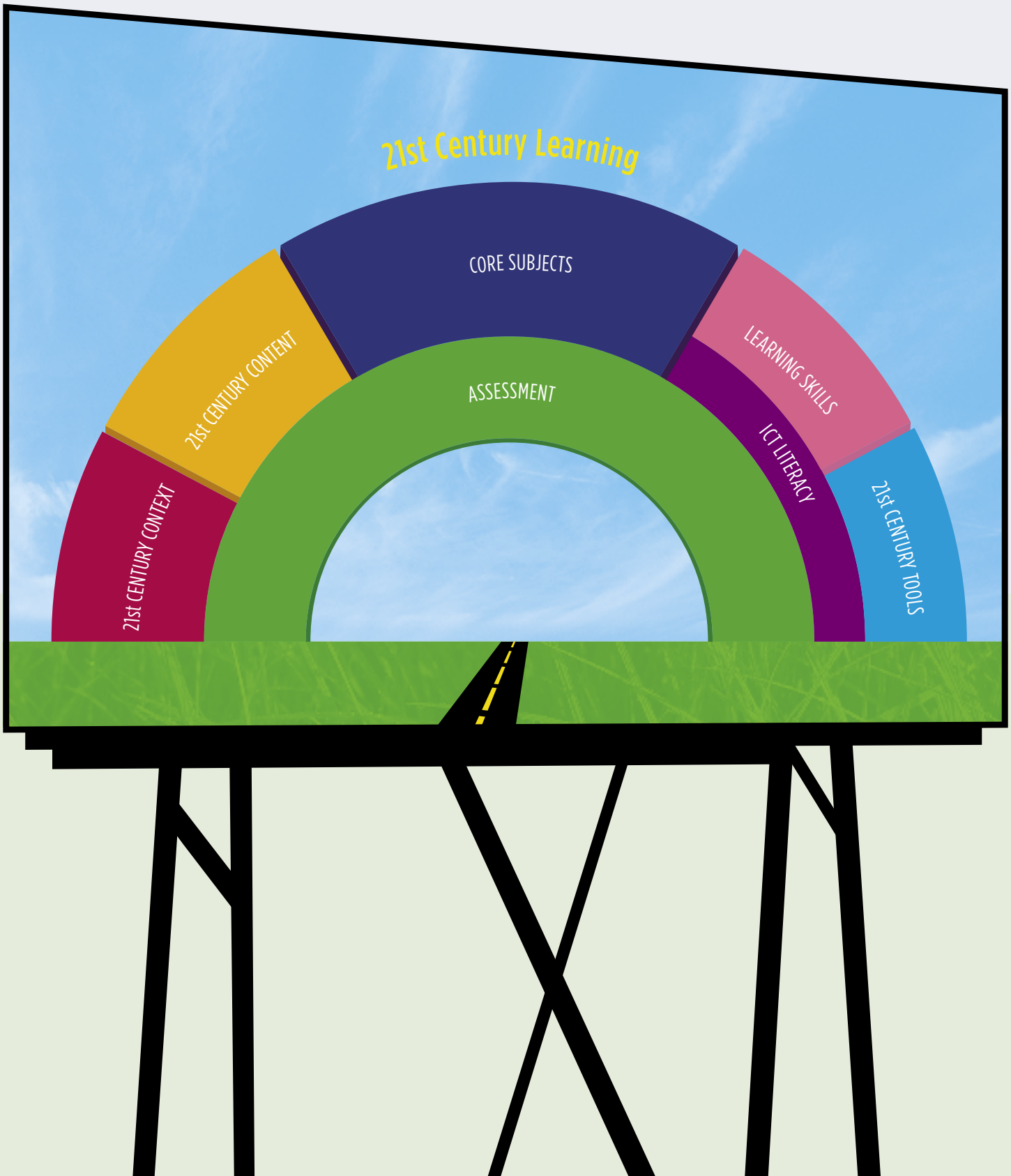
21st Century Learning
CORE SUBJECTS
21st CENTURY CONTENT
LEARNING SKILLS
ASSESSMENT
ICT LITERACY
21st CENTURY CONTEXT
21st CENTURY TOOLS


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