

21ST CENTURY KNOWLEDGE AND SKILLS IN EDUCATOR PREPARATION

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PARTNERSHIP FOR
21ST CENTURY SKILLS



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A LETTER TO EDUCATOR PREPARATION LEADERS

It is hard to imagine a time when the opportunity and need to transform American education has been greater. To be college and career ready today, student learning must go beyond mastery of core subjects and include 21st century knowledge and skills like critical thinking, communication, collaboration, and technology literacy.

The American Association of Colleges for Teacher Education (AACTE) and the Partnership for 21st Century Skills believe new teacher candidates must be equipped with 21st century knowledge and skills and learn how to integrate them into their classroom practice for our nation to realize its goal of successfully meeting the challenges of this century. This is not a matter of teaching either academic or 21st century knowledge and skills. It's about fusing the two, so that our children meet the demands of a global economy, as well as engage in good citizenship and participate fully in a vibrant and civil society. This paper is an important step in an effort to promote the inclusion of 21st century knowledge and skills formally into teacher preparation programs. In subsequent phases of this work, we hope to provide additional resources and technical assistance to support this effort among colleges of education nationwide.

In late 2009, a shared sense of urgency prompted a group of deans to come together to consider how educator preparation programs might embed 21st century knowledge and skills more effectively in their programs. The result of their effort is this paper, which was distributed to AACTE's membership in draft form for discussion at four sessions at the February 2010 Annual Meeting. This paper's goals are to:

- Help establish a shared vision around 21st century knowledge and skills in educator preparation programs; and
- Spark meaningful dialogue among higher education leaders (presidents, provosts, deans, and faculty) about implementing this vision in educator preparation.

The work to date reflects a great deal of feedback received at the AACTE conference as well as through a widespread call for feedback. The paper's themes are also reflective of a number of recent developments in P-12 education. The final standards released by the Common Core State Standards Initiative in June 2010 include many of the 21st century skills outlined in this paper, which will be required across disciplines. It is expected that acquisition of these skills will be also be reflected in the work of the National Council for Accreditation of Teacher Education's (NCATE) Blue Ribbon Panel on Clinical Preparation, Partnerships and Improved Student Learning and the Interstate New Teacher Assessment and Support Consortium (INTASC) revision of the INTASC Model Standards for Beginning Teacher Licensing, Assessment and Development.

We are hopeful this white paper will stimulate conversation and ideas that can enrich your transformative efforts. Against the backdrop of a severe downturn in our economy, changing state and national policies, and rising accountability and expectations, the challenges of embedding 21st century knowledge and skills are great. Great challenges require bold leadership. We hope you will join us in advancing educator preparation so that every child will thrive in their personal life, their community and the workplace.

Sharon P. Robinson
President/CEO, AACTE

Ken Kay
President, Partnership for 21st Century Skills

CORE PRINCIPLES ON 21ST CENTURY SKILLS AND EDUCATOR PREPARATION

The American Association of Colleges for Teacher Education (AACTE) advisory group and the strategic council of the Partnership for 21st Century Skills have approved the following core principles, representing a shared vision for integrating 21st century skills into educator preparation.

1. P-12 education will prepare all students with 21st century knowledge and skills.
2. P-12 teachers and administrators will possess, teach and assess 21st century knowledge and skills.
3. Educator preparation programs will prepare their graduates to possess, teach and assess 21st century knowledge and skills.
4. New teachers will be prepared to become change agents for embedding 21st century knowledge and skills in all subjects in P-12 curricula in accordance with national and state standards.
5. Higher education leaders will work with leaders in P-12 and local communities to inform the redesign of educator preparation programs to more effectively meet the needs of 21st century learners.
6. Each educator preparation program will develop a 21st century blueprint for transforming itself into a 21st century program.
7. Educator preparation programs will be recognized as sources of leadership in developing 21st century education and learning strategies.
8. Educator preparation programs will be at the forefront of research and evaluation of 21st century education.

INTRODUCTION

“To keep America competitive, and to make the American dream of equal educational opportunity a reality, we need to recruit, reward, train, learn from, and honor a new generation of talented teachers. But the bar must be raised for successful teacher preparation programs because we ask much more of teachers today than even a decade ago. Today teachers are asked to achieve significant academic growth for all students at the same time that they instruct students with ever-more diverse needs. Teaching has never been more difficult, it has never been more important, and the desperate need for more student success has never been so urgent. Are we adequately preparing future teachers to win this critical battle?”

– U.S. Secretary of Education Arne Duncan, 2009

This is an exciting and challenging time for teacher educators. The nature of teaching is changing. In an effort to transform themselves into exemplary educator preparation institutions, many programs are becoming more entrepreneurial, recognizing new opportunities and making changes required to respond to the needs of 21st century learners.

Many are successfully engaged in strategies such as:

- Providing high-quality alternative routes to teaching,
- Building on private and public partnerships that share common sets of ideas in advancing education reforms,
- Effectively partnering with urban schools to prepare teacher candidates to teach in urban environments with large numbers of culturally and linguistically diverse learners,
- Playing a greater role with charter and other experimental/alternative schools,
- Effectively recruiting career changers to build the teacher workforce,
- Creating a robust clinical experience for teacher candidates, including year-long teaching residency programs, and
- Growing a network of over 1,000 professional development schools designed after the medical model of clinical training.

In order to meet the challenges and demands of the profession, AACTE is leading reform efforts that:

- Provide evidence that the teachers prepared at member institutions will have a positive effect on their students’ learning,
- Go beyond providing content knowledge and prepare teachers to differentiate their instruction to reach all children, especially those most at risk for school failure: children with disabilities, English language learners, and children from low-income homes,
- Ensure that teacher candidates receive extensive, in-depth clinical experiences with mentoring support that requires performance evaluation tied to the teacher licensure process and high standards for beginning practice,
- Create fast-track, yet high-quality, teacher preparation programs in close partnership with school districts to meet specific teacher shortages,

INTRODUCTION (Cont.)

- Engage prospective teachers in creating instruction aligned with their state’s curriculum standards, effectively interpreting assessment results, responding to students’ learning needs, and cultivating a passion for learning that will support students for a lifetime, and
- Meet the demands of the global economy by exemplifying, and embedding in instruction, the mastery of 21st century skills such as critical thinking, problem-solving, communication, collaboration and creativity and innovation. This includes the application of technology to support more robust instructional methods and understanding the relationship between content, pedagogy and technology through dissemination of Technological Pedagogical Content Knowledge (TPCK) theory and research (American Association of Colleges of Teacher Education 2008, US Department of Education 2010).

While all of these efforts are interconnected and critical to the transformation of educator preparation, **the purpose of this paper is to create the foundation for ongoing dialogue around how 21st century knowledge and skills can be appropriately embedded in educator preparation, and to guide the development of resources and services to support educator programs.** With your help we intend to:

- Develop a blueprint for building the models, tools, resource base, and capacity needed to support this work,
- Create an infrastructure of leadership and communications that will support the contributions of educator preparation programs and other key stakeholders to this initiative, and
- Provide faculty training and resource pilot initiatives and partnerships to develop and test 21st century instructional models among higher education institutions nationwide.

PREPARING STUDENTS FOR THE 21ST CENTURY ECONOMY

Today as never before, meeting our society’s challenges demands educational excellence. Reinvigorating the economy, achieving energy independence with alternative technologies and green jobs, and strengthening our health care system require a skilled populace that is ready for the critical challenges we face. There is widespread consensus, however, that our education systems are failing to adequately prepare all students with the essential 21st century knowledge and skills necessary to succeed in life, career and citizenship.

Three significant competitive realities underscore why our education systems are due for dramatic change:

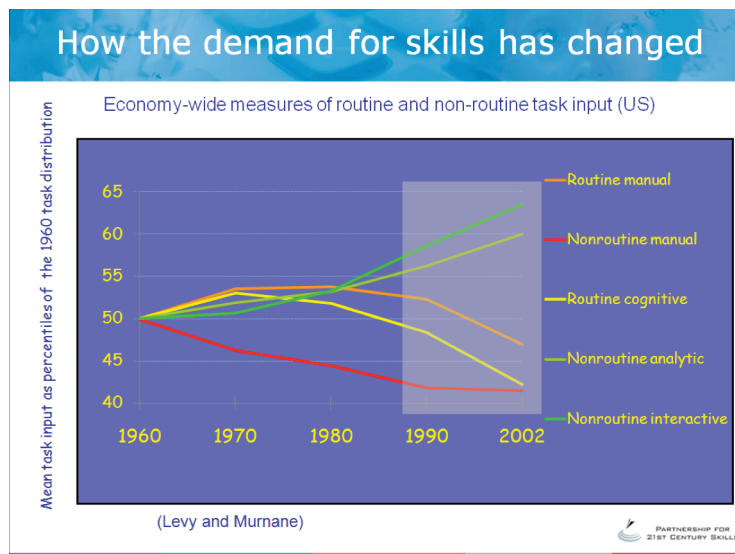
- 1. The United States faces two student achievement gaps.** For the past decade, the United States has focused nationally on closing achievement gaps between the lowest- and highest-performing students, and between the poorest and most affluent. Equally important, however, is the global achievement gap between U.S. students—including our top-performing students—and their international peers in competitor nations. U.S. students fare poorly compared to their counterparts on international assessments, such as the Programme for International Student Assessment (PISA). These results are economically significant. Countries that do well on PISA, which measures 21st century skills such as critical thinking and problem solving, have demonstrated higher increases in GDP

growth than countries that do not, according to a series of studies by Stanford University researchers (Partnership for 21st Century Skills 2008). An unintended consequence of progress in closing national achievement gaps has been a lack of attention to the global achievement gap—and to the growing competitive demand for advanced skills.

2. Fundamental changes in the economy, jobs, and businesses have reshaped workplaces and the nature of work. Over the last several decades, the industrial economy based on manufacturing has shifted to a service economy driven by information, knowledge, innovation and creativity. Today, more than 80 percent of jobs are in the service sector, which includes high-growth, high-wage and high-skilled occupations in new and emerging industries. In this new, globally interconnected economy, companies have changed how they are organized and the way they do business. Technology has supported these changes, which include flatter management structures, decentralized decision making, information sharing and the use of task teams, cross-organizational networking, just-in-time inventory and flexible work arrangements.

3. The fundamental changes in the economy, jobs, and businesses are driving new, different skill demands. Today more than ever, individuals must be able to perform non-routine, creative tasks if they are to succeed. While skills like self-direction, creativity, critical thinking, and innovation may not be new to the 21st century, they are newly relevant in an age where the ability to excel at non-routine work is not only rewarded, but expected as a basic requirement. Whether a high school graduate plans to enter the workforce directly, or attend a vocational school, community college, or university, it is a requirement to be able to think critically, solve problems, communicate, collaborate, find good information quickly, and use technology effectively. These are today's survival skills—not only for career success, but for personal and civic quality of life as well (Partnership for 21st Century Skills 2010).

The chart below demonstrates how the demands for skills have changed over the years (Autor, Levy and Murnane 2003).



Given the three trends discussed above, what are the implications for today's educators? What role should educator preparation programs play in enacting change?

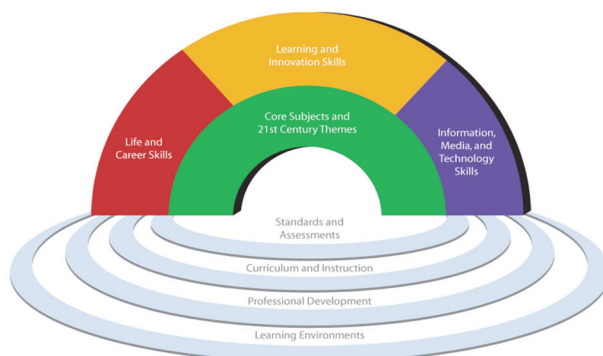
We have the opportunity to establish a vibrant vision for educator preparation, one that leverages the best of what has worked in the past, combined with what educators need now and in the future, in order to prepare all students for the future they deserve. As the national momentum toward accountability in the teaching profession (linking student outcomes with teacher performance) gains traction, it is more important than ever that we support all educators in developing 21st century knowledge and skills among their students, so they are ready to meet the needs of the global economy, engage in good citizenship, and participate fully in a vibrant and civil society.

WHAT DO P-12 STUDENTS NEED TO KNOW AND DO?

Many leaders and organizations in the past decade, including the Partnership for 21st Century Skills (P21), have been working to better prepare today's graduates for a world in which academic content mastery and skills such as critical thinking, communication, technology literacy, and collaboration are required for success in college, life, and career. P21 and its 14 state partners focus on the importance of 21st century knowledge and skills as the indispensable currency for participation, achievement, and competitiveness in our global community.

P21's major contribution has been to establish consensus around the definition of 21st century student outcomes. The P21 framework for 21st century teaching and learning has been refined over a six year period with input from hundreds of educators, business leaders, community leaders, parents, students; and policymakers. The graphic below illustrates the framework for 21st Century Student Outcomes and Support Systems. The Framework describes the skills, knowledge and expertise students must master to succeed in work and life—a blend of content, knowledge, specific skills, expertise and literacies. For a more detailed explanation of the framework, including definitions, please see Appendix B. You can also visit www.p21.org for information on the P21 as well as the Framework.

21st Century Student Outcomes and Support Systems



Core Subjects and 21st Century Themes

Core subjects as defined by the Elementary and Secondary Education Act (ESEA) include English, reading or language arts, world languages, arts, mathematics, economics, science, geography, history, government and civics. The recently released National Educational Technology Plan reiterates, "Whether the domain is English language arts, mathematics, sciences, social studies, history, art, or music, 21st century competencies and expertise such as critical thinking, complex problem solving, collaboration, and multimedia communication should be woven into all content areas" (US Department of Education 2010, 4). Equally important is gaining a knowledge and understanding of the interdisciplinary nature of learning which includes the intersections between core subjects.

In addition to academic subject areas, **21st century interdisciplinary themes** are equally important in promoting understanding of academic content at much higher levels.

These themes include:

- **Global Awareness**, e.g. understanding global issues, other nations and other cultures.
- **Financial, Economic, Business and Entrepreneurial Literacy**, e.g., knowing how to make economic choices, understanding the role of the economy in society.
- **Civic Literacy**, e.g. learning how to participate effectively in civic life; exercising the rights and obligations of citizenship.
- **Health Literacy**, e.g., obtaining, interpreting and understanding basic health information and services; understanding preventive physical and mental health measures.
- **Environmental Literacy**, e.g., demonstrating knowledge and understanding of the environment and the circumstances and conditions affecting it; taking individual and collective action towards addressing environmental challenges.

Learning and Innovation Skills

These are the skills most often cited when referring to 21st century skills. They are increasingly being recognized as attributes that separate students who are prepared for a more and more complex life and work environment in the 21st century, from those who are not.

- **Critical Thinking and Problem Solving**, e.g., effectively analyze and evaluate evidence, arguments, claims and beliefs; solve different kinds of non-familiar problems in both conventional and innovative ways.
- **Communication**, e.g., articulate thoughts and ideas effectively using oral and written communication skills in a variety of forms and contexts.
- **Collaboration**, e.g., demonstrate ability to work effectively and respectfully with diverse teams.
- **Creativity and Innovation**, e.g., use a wide range of idea creation techniques to create new and worthwhile ideas.

Information, Media and Technology Skills

Information Literacy, e.g., access and evaluate information critically and competently; manage the flow of information from a wide variety of sources.

Media Literacy, e.g., understand both how and why media messages are constructed; create media products by understanding and utilizing the most appropriate media creation tools, characteristics and conventions.

ICT (Information, Communications, and Technology) Literacy, e.g., use technology as a tool to research, organize, evaluate and communicate information.

Life and Career Skills

Today's life and work environments require far more than thinking skills and content knowledge. Cultivating the ability to navigate the complex life and work environments requires students to pay rigorous attention to developing adequate life and career skills.

- **Flexibility and Adaptability**
- **Initiative and Self-Direction**
- **Social and Cross-Cultural Skills**
- **Productivity and Accountability**
- **Leadership and Responsibility**

Please refer to Appendix B for a detailed description of these skills.

Technological Pedagogical Content Knowledge (TPCK) for Educators

In addition to the general competencies described by the P21 framework (above), it is important to highlight the important work of AACTE's Committee on Innovation and Technology around technology integration in educator preparation programs.

AACTE, through the *Handbook of Technological Pedagogical Content Knowledge for Educators (TPCK)*, has developed a highly effective framework for the integration of technologies in education in all content areas (American Association of technologies in education in all content areas (American Association of Colleges of Teacher Education 2008).

TPCK or Technological Pedagogical Content Knowledge is a framework to understand and describe the kinds of knowledge needed by a teacher for effective integration of technology in all content areas. The TPCK framework argues that effective technology integration for teaching specific content or subject matter requires understanding and negotiating the relationships between these three components: technology, pedagogy, and content.

Example of 21st Century teaching with the TPCK framework

A report about students computing the distance to the moon using publicly available data is a great example of how teachers can leverage new technologies to develop pedagogical approaches to content. Students were instructed to download from the NASA website and analyze an MP3 recording of the conversation, and more importantly the echo, between Neil Armstrong on the surface of the moon and ground control in Houston, Texas. Students re-purposed the open source audio editing program Audacity™ to accurately measure the echo's delay and used these data to compute the distance to the moon. While this process may seem easy and straightforward it is in fact complicated, and carries the possibility of error, and the challenges of group decision-making. It is through creatively meeting these needs and other challenges that this project exemplifies the kind of classroom activities that integrate curriculum, pedagogy, and technology as well as foster 21st century skills in students.

For more information about TPCK, please see the *Handbook of Technological Pedagogical Content Knowledge for Educators*.

WHAT DO EDUCATORS NEED TO KNOW AND DO?

If we commit to a vision of 21st century knowledge and skills for all students, it is critical that we support educators in mastering the competencies that ensure positive learning outcomes for students. These include:

- Successfully aligning technologies with content and pedagogy and developing the ability to creatively use technologies to meet specific learning needs,
- Aligning instruction with standards, particularly those standards that embody 21st century knowledge and skills,
- Balancing direct instruction strategically with project-oriented teaching methods,
- Applying child and adolescent development knowledge to educator preparation and education policy,
- Using a range of assessment strategies to evaluate student performance and differentiate instruction (including but not limited to formative, portfolio-based, curriculum-embedded and summative),
- Participating actively in learning communities; tapping the expertise within a school or school district through coaching, mentoring, knowledge-sharing, and team teaching,
- Acting as mentors and peer coaches with fellow educators,
- Using a range of strategies (such as formative assessments) to reach diverse students and to create environments that support differentiated teaching and learning, and

- Pursuing continuous learning opportunities and embracing career-long learning as a professional ethic.

With consensus around a common vision for P-12 student outcomes and educator competencies, leaders in educator preparation can begin to align their policies, programs, and systems to develop an integrated understanding of the relationship between technologies, pedagogies, and content areas (AACTE 2008) and continually scaffold educators' evolution from pre-service through induction and at every stage of their careers.

HOW CAN EDUCATOR PREPARATION PROGRAMS RESPOND?

"One of the most damaging myths prevailing in American education is the notion that good teachers are born and not made...A companion myth is the idea that good teacher education programs are virtually nonexistent and perhaps even impossible to construct."

– Linda Darling-Hammond, 2006

ALIGNING WITH P-12 21ST CENTURY KNOWLEDGE AND SKILLS INITIATIVES

For several years now, education leaders in many states, districts, and schools have pursued 21st century knowledge and skills initiatives. The most effective of these are focused on integrating 21st century knowledge and skills into each of the essential P-12 education support systems:

- Standards
- Assessments
- Curriculum and Instruction
- Professional Development
- Learning Environments

The matrix below describes each element of an ideal P-12 21st century skills initiative, aligned with the related conditions and desired outcomes of educator preparation programs. The chart provides a high-level view of how the two systems—P-12 school and district systems on the one hand, and educator preparation programs on the other—can align to produce better 21st century outcomes for both educators and their prospective students.

A Vision for Alignment - 21st Century Knowledge and Skills Initiatives in P-12 Schools and Educator Preparation		Desired outcomes for program graduates
P-12 system essential condition	How educator preparation programs can align	
21st CENTURY STANDARDS		
All academic subject standards incorporate 21st century knowledge and skills.	Educator preparation standards incorporate 21st century knowledge and skills and align with student standards. Programs incorporate 21st century student and educator preparation standards in a coherent, comprehensive way.	Program graduates model and teach mastery of all academic subjects and possess interdisciplinary understanding along with 21st century skills.
21st CENTURY ASSESSMENT		
A balanced system of state, district, and classroom assessments measure the mastery of 21st century student knowledge and skills over time.	21st century knowledge and skills assessment strategies are key components of the program's curriculum and assessments. Programs serve as a research and evaluation test bed for innovative approaches to student measurement.	Program graduates use a wide range of assessment strategies to evaluate 21st century student knowledge and skills. Program graduates demonstrate mastery of 21st century knowledge and skills.
21st CENTURY CURRICULUM AND INSTRUCTION		
Curriculum is designed for understanding (e.g., avoids being "a mile wide and an inch deep"). Educators employ teaching for understanding principles in daily practice.	Program curriculum supports deep understanding among teacher candidates. Program curriculum integrates the TPCK framework among teacher candidates and supports flexible repurposing of technologies to meet specific disciplinary and pedagogical needs. Instruction integrates inquiry-based models and extensive, connected clinical experiences that tie real practice to theory.	Educators act as facilitators of learning and put students at the center; they demonstrate they can use classroom strategies (including appropriate uses of technology) that enable students to work in groups, make decisions together, craft consensus, and act to achieve agreed-upon goals. Program graduates develop and deliver lessons and units that connect the most essential concepts and skills students need to know and do; this means avoiding teaching disparate, unconnected facts that could inhibit the development of critical thinking, problem solving and other 21st century skills.
21st CENTURY PROFESSIONAL DEVELOPMENT		
Scalable, sustainable in-service professional learning systems integrate 21st century knowledge and skills to support continual growth in all areas of teaching related to content, pedagogy and technology in an interdisciplinary manner.	Programs partner directly with P-12 schools to enable high-quality, continuous 21st century professional learning opportunities for all educators at every career stage. Program focuses intensely on supporting induction and continuous improvement.	Program graduates pursue 21st century professional learning opportunities as in-service teachers; they act as peer coaches and mentors to fellow educators.
21st CENTURY LEARNING ENVIRONMENTS		
Flexible units of time enable interdisciplinary, project-based teaching and learning. Physical and technological infrastructure supports collaborative, project-based learning in all academic subject areas. School environments are safe and nurture the development of the whole child.	Flexible units of time enable interdisciplinary project-based teaching and learning. Current technology tools and resources are widely available and used with careful consideration to content and pedagogy as well as their effective integration. Programs support educators in developing into healthy, ethical, responsible individuals who are professionally and civically engaged.	Program graduates are environmentally literate, health literate, financially literate, civically engaged, and globally competent. They are flexible, responsible, and adaptable. Program graduates use technologies fluently and in pedagogically appropriate ways in all content areas, in daily practice. Graduates are attuned to and act as advocates for the emotional, physical, and educational needs of all their students.

What are the most important components of programs that embed 21st century knowledge and skills? This section covers the ways in which programs can integrate 21st century knowledge and skills more purposefully in their reform efforts:

- Leadership
- Program Design
 - o Curriculum
 - o Instructional Models
 - o Assessment
- Learning Environments
- Partnerships
- Continuous Improvement

LEADERSHIP

“The challenge facing education schools is not to do a better job at what they are already doing, but to do a fundamentally different job. They are now in the business of preparing educators for a new world.”

– Arthur Levine, 2006

The program leadership team sets the tone for 21st century teaching and learning. It is critical for this leadership team to grapple with questions such as these:

- What student outcomes are most important?
- How do we prepare educators to produce such student outcomes?
- What program changes need to be made? Is it time for a complete redesign of our program?
- How do we engage faculty in both the school of education and schools of arts and sciences in this process?
- How does our commitment to 21st century teaching guide the hiring of new faculty?

Because of the interdisciplinary and interdependent nature of educator preparation within institutions of higher education, implementing a 21st century vision will be much more successful if it is part of a college- or university-wide transformation. Once preliminary work has been completed by the program leadership team, therefore, it is preferable to pursue a university-wide approach that involves the president, provosts, and other department heads and deans.

When it comes to hiring new education faculty, for example, the vision around 21st century teaching and learning can play a key role in developing a team that is not only committed to this change but prepared to help lead its implementation.

The following steps are suggested for both university-wide and program-specific leadership teams:

- Build consensus among the university leadership, program leadership, and other stakeholders around this vision.
- Form advisory groups with key stakeholders to help guide and lead the effort.
- Focus goals of educator preparation around student mastery of academic content knowledge as well as with 21st century skills, including critical thinking, problem solving, communication, technology literacy, collaboration and creativity.
- Engage faculty in the creation of rubrics to help guide and manage progress.
- Engage faculty in identifying, designing; and implementing professional development communities around this vision.
- Review and align program goals, strategies, content; and processes in ways that support educators in teaching for 21st century skills outcomes.
- Develop formative and summative performance-based assessment tools and strategies that are consistent with this vision.
- Commit to hiring, developing, retaining; and rewarding faculty who are committed to this vision.
- Incorporate these program goals into candidate recruitment and selection processes.
- Promote and support research and evaluation of 21st century education.

New Educators for the New Texas

At Texas State University-San Marcos, “New Educators for the New Texas” is the tagline for the College of Education’s strategic initiative to ground its educator preparation programs in 21st century teaching and learning that are responsive to our changing demographics and world. The initiative’s ultimate goal is to have the College become a campus site for educational innovation and equity, and in order to do so, “we must disrupt past patterns and practices in teaching and learning,” says Dr. Rosalinda Barrera, former dean of the College of Education and, now, assistant deputy director and director of the office of English language acquisition for the U.S. Department of Education. Recent steps in the College’s renewal and redesign of teacher preparation include (1) offering elementary (K-6) certification in only two options – ESL Generalist and Bilingual Generalist, (2) creating an Office of Educator Preparation led by an educational technology faculty member, and (3) infusing content on English language learners and 21st century skills and knowledge throughout the curriculum for the new federally-funded Teacher Residency Program. This latest endeavor will reform the Secondary Education and Special Education programs by making them more inclusive of and attuned to 21st century students and schools. The Teacher Residency Program is a partnership with the Austin Independent School District, other campus units, and community and corporate partners, designed to increase the number of secondary teachers certified to teach math and science and graduate with a master’s degree. “While the College’s overall teacher preparation enterprise is at the ‘transitional’ or hybrid stage of institutionalizing new ways of teaching and learning, to borrow from Tom Carroll’s three-step progression on educational transformation,” Dr. Barrera reports, “bringing all such programs into the 21st century has been steadily gaining faculty support and momentum.” Next to be reviewed and re-conceptualized will be the middle school certification program, while other programs already in transition will continue to be improved.

PROGRAM DESIGN

Program re-design is one of the most vital aspects of a 21st century educator preparation initiative. Accreditation requirements, state standards; and professional teaching standards add additional layers to the challenge of integrating skills more purposefully into a program and its curriculum, instructional models; and assessments.

There is growing consensus around and evidence to support common fundamentals of an effective educator preparation program (Darling-Hammond 2006). These include:

- Coherence
- Strong Interdisciplinary Curriculum
- Extensive, Connected Clinical Experience
- Inquiry Approach
- School-University Partnerships
- Performance-Based Assessment Based on Professional Standards

Successful integration of 21st century knowledge and skills into a program and its curricula, then, takes concerted effort at each step of the way. The following questions are important to consider:

- Is there a coherent approach to integrating 21st century knowledge and skills into the program and its curriculum?
- Does the curriculum explicitly focus on the instructional models that best lead to student development of higher order thinking skills in an interdisciplinary manner?
- Does the curriculum apply knowledge of child and adolescent development?
- Are clinical experience opportunities sufficiently grounded in the practice of teaching not only core subjects but also applied student mastery of 21st century skills? Are they designed to go beyond the “transmission method” of teaching and instead offer teacher candidates experiences that help them develop rich, applied learning opportunities for all students?
- Do teacher candidates’ evaluations include an understanding and ability to implement best practices around 21st century skills development among students?
- Does the program develop and assess higher order thinking skills in its own students?
- Does the program leverage current technologies, along with the TPCK framework, that stress ICT literacy to enhance educator capacity to learn and teach 21st century knowledge and skills?

Transforming Undergraduate Preparation at National-Louis University

One of the program's most innovative as well as challenging initiatives focuses on transforming NLU's undergraduate offerings in developing academic programs and learning communities that:

- Provide a high quality general education background in core subjects, 21st century learning, innovation, and technology skills—in addition to rigorous professional training;
- Offer predictable and affordable educational experiences for working adults of all ages;
- Challenge individuals to take responsibility for achieving their learning goals while providing specific support for non-traditional college students, many of whom represent the first generation in their families to attend college;
- Foster creativity, critical thinking, problem-solving, and collaboration;
- Develop information, media, and technology skills as tools for life-long learning; and
- Benefit from NLU's extensive network of community partners.

To support these transformation efforts, the provost formed a flexible, cross-university “skunk works” team of approximately 20 people. This innovation-focused group, which meets weekly, is comprised of the deans of Education, Arts & Sciences, Management & Business, and the Library, the provost staff, and key administrators from marketing, enrollment, financial aid, the NLU Latino Initiative, and Institutional Advancement.

The undergraduate initiative currently has three prongs:

- The roll out of an innovative B.S. in management degree in the College of Management & Business;
- The transformation of undergraduate teacher preparation in the National College of Education; and
- The re-envisioning of the applied behavioral science degree in the College of Arts & Sciences—one of the University's most popular programs.

The emergent undergraduate model being collaboratively developed across the University and applied to the transformation of undergraduate teacher education reinvigorates the College of Education's mission through rigorous preparation for the 21st century educators and by providing access and support for diverse candidates.

CURRICULUM

What are the key elements of optimal curricula that will help teacher candidates develop the dispositions, habits of mind; and confidence to enable students to develop 21st century knowledge and skills in a range of core academic subject areas?

Effective P-12 schools today do not employ curriculum as a standardized, one-size-fits-all “plug-and-play” component. The changing demographics of the student population nationally, let alone the rapid advances of technologies, mean that teacher candidates can expect to play an active role in developing and organizing content and instruction for their students.

A 21st century approach to curriculum is about more than just adding an extra course or extra class time in the program's curriculum. Preservice teachers benefit from the ability to fully explore and understand how to develop and use curriculum for deep understanding and mastery of academic subject knowledge and 21st century skills.

As a starting point, educator preparation program curricula can align with student and teacher standards in ways that blend thinking and innovation skills, ICT literacy; and life and career skills in the context of all academic subjects and across interdisciplinary themes.

An effective 21st century skills approach to curriculum, in other words, is designed for understanding (McTighe and Wiggins 2005). The program's curriculum will be most beneficial to teacher candidates if it is designed to produce deep understanding and authentic application of 21st century skills in all subject areas.

John Bransford, Ann Brown and Rodney Cocking observed that many people mistakenly feel students cannot be asked to master what are sometimes called "higher-level skills" unless they first learn basic content like that tested on standardized tests. But actually, they state, "People are built to be learners who inquire and interrogate and get feedback as they learn to solve complex problems. So learning-to-learn and inquiry skills, guided by the ability to ask relevant questions due to knowledge of the 'big ideas' of various disciplines, are actually the fundamental skills that we need to emphasize" (Bransford, Brown and Cocking 2000).

A NOTE ABOUT 21st CENTURY STANDARDS

Every educator preparation program curriculum must align with core standards for students. A profound development in the standards movement is now underway in the Common Core State Standards Initiative headed by the National Governors Association and the Council for Chief State School Officers. The standards for English Language Arts and mathematics include competencies like reasoning, critical thinking and problem solving. Significantly, some states have already been working to implement such transformations in both student and teacher standards. States like North Carolina and West Virginia have adopted rigorous student and teacher standards that incorporate 21st century skills, and are collaborating with educator preparation programs to ensure systemic approaches to these reforms.

Additionally, the Interstate (INTASC) is currently revising its core standards, in part to better reflect 21st century skills.

Each of these initiatives has the potential to affect P-12 teacher preparation in significant ways.

A particular focus on the competencies involved in developing curriculum is also critical. For teacher candidates, "the capacity to plan instruction so that it meets the needs of students and the demands of content, so that it is purposeful and adds up to important, well-developed abilities for students, is not something most teachers know how to do intuitively or learn from unguided classroom experience" (Darling-Hammond 2006). This extends also to "assessment literacy," something all teacher candidates benefit from mastering in their programs of study. For example, it is important that teachers have the ability to read and interpret assessment data accurately (which may include student portfolios, test scores, collaborative projects, etc.) and differentiate classroom practice in precise and appropriate ways. Particularly for a high school teacher, it is helpful to develop this kind of understanding before entering the classroom (Miller 2009).

Educator preparation programs, then, play an important role not only in modeling effective curriculum and instruction that addresses both content and skills so that their own students will learn well; they offer important, structured opportunities for teacher candidates to learn how to plan curriculum, set learning goals for their students, organize daily practice; and evaluate their own and their students' successes along the way. In short, educator preparation programs play a key role in helping all educators learn, develop, practice, refine; and assess 21st century curriculum, planning; and instruction.

University of Vermont - Complex Instruction

Drawing on the pedagogical approach known as Complex Instruction (CI), which enables teachers to create intellectually challenging tasks for all students, the Elementary Education Program at the University of Vermont requires that each of the student teachers implement CI rotations during their final internship.

This strategy requires that the students:

- Utilize a pre- and post-assessment to evaluate academic success.
- Establish group norms.
- Create status treatments to equalize status.
- Assign competence to all students.
- Create rich multiple abilities tasks.
- Establish and use evaluative criteria.

CI enables the candidates to evaluate the academic progress of all students, especially those at risk, by creating cooperative groups that treat status issues in diverse classrooms. They actually implement several CI rotations and document the context of their experience in a structures paper, which accompanies their plans. This has proven to be a very effective and innovative tool that candidates bring into Vermont schools.

INSTRUCTIONAL MODELS

Instructional models are an important component of any educator preparation program. The integration of innovative and research-proven teaching strategies, modern learning technologies and real world resources and contexts, are all critical. Educator programs may wish to consider the following:

- **Integrate “teach for understanding” principles.** When teacher candidates are fluent in developing and delivering lessons and units that connect the most essential concepts and skills students need to know and do with the appropriate integration of technologies, skills such as critical thinking and problem solving are natural outcomes in the classroom.
- **Create rich clinical experiences.** There is widespread agreement around the need to construct rich clinical experiences for teacher candidates; these experiences ideally allow candidates to connect theory with clinical practice.
- **Create vibrant learning communities and peer mentoring networks.** Teacher candidates benefit greatly from personal learning communities (PLC’s) within the program and as part of their clinical experiences. Integrated technology-based support for PLC’s provides the time and space to reflect and refine instructional methods that enhance 21st century knowledge and skills mastery in classroom practice. Design-based learning approaches have also been found to be particularly successful in developing pre-service and in-service teachers’ pedagogical skills, especially around integrating technology appropriately into practice.
- **Examine the role of content, pedagogy and technologies in developing higher order thinking skills.** The ability to teach for content mastery, while also developing 21st century skills among students, is a challenging proposition for most teacher candidates. The best approach to teaching critical thinking in the context of mathematics, for example, may well differ from the ideal methods for teaching critical thinking in the context of an English language arts course. Additionally, the TPCK framework (AACTE 2008) argues that teachers need to develop the skills and knowledge to thoughtfully integrate content, pedagogy and technologies in their teaching. Through leadership on this issue from within educator preparation programs, as well as through partnerships with colleagues throughout colleges of arts and sciences, enormous benefits can be provided to current candidates as well as to the field in general.

West Virginia University – Transformational Innovation

The College of Human Resources and Education at West Virginia University is gearing up to prepare educators for a global world. Responding to the immediate state and national needs for teachers prepared with 21st century skills and knowledge, the College is piloting a three-year, year-round teacher education program focused on providing a broad understanding of world regions and societies and an in-depth knowledge of pedagogy and human learning. To accomplish this, the program includes three clinical experiences: one rural, one urban; and one international. Clinical rotations, utilized so that college faculty may visit top classrooms with their students, allow immediate discourse regarding best practices. Technology, used extensively throughout the program, includes 1) web cams, SKYPE, video conferencing; and more for observation and connectivity between pre-service candidates and teacher experts world-wide; and 2) gaming, social networking, Second Life and simulation technology to provide candidates with opportunities to network as teams, hone their classroom management skills as teacher avatars, and interact virtually with special students and those for whom English is a second language. Special Education and English language learning instructional skills are embedded in the program to support the needs of all 21st century students. Pedagogy, taught previously as separate skill sets, is combined into modules so that connectivity between content such as math and science is more apparent. The study of foreign language is encouraged. The goal? World-ready educators, strong scholars eager to take charge of today's classrooms, in three years or less from admission to graduation.

ASSESSMENT

Over the past two decades, assessment has played a central role in education policy in the United States, as it has in other countries for many decades. Large-scale, summative assessments, for example, are viewed as powerful levers for influencing what happens in schools and classrooms, and as such, assessment studies are routinely carried out to gauge the strengths and weaknesses of students.

In recent years, educators, business leaders, and policymakers in the United States have questioned whether the current design of assessment systems focuses too much on measuring students' ability to recall discrete facts using multiple-choice tests at the cost of not adequately measuring a student's ability to engage in and complete complex thinking and problem-solving tasks. The end result is a widening gap between the knowledge and skills students are acquiring in schools and the knowledge and skills needed to succeed in the increasingly global, technology-infused, 21st century workplace. While the current assessment landscape is replete with assessments that measure knowledge of core content areas such as language arts, mathematics, science; and social studies, there is a comparative lack of assessments and analyses focused on 21st century knowledge and skills. Current tests fall short in several key ways:

- The tests are not designed to gauge how well students apply what they know to new situations or evaluate how students might use technologies to solve problems or communicate ideas.
- While teachers and schools are being asked to modify their practice based on standardized test data, the tests are not designed to help teachers make decisions about how to target their daily instruction.
- Current testing systems are rarely designed to measure a school or district's contribution to learning from a student's first day until his or her last day.

With spending on assessment development in the United States expected to grow into the billions of dollars this decade, it is vital that our investment focuses not merely on fulfilling federal requirements, but on preparing today's children to face the challenges of tomorrow's complex communities and workplaces. A balanced assessment system that measures 21st century knowledge and skills:

- Supports a range of assessments, including high-quality standardized testing along with effective classroom formative and summative assessments,
- Emphasizes useful feedback on student performance that is embedded into everyday learning,
- Requires a balance of technology-enhanced, formative and summative assessments that measure student mastery of 21st century knowledge and skills,
- Enables development of portfolios of student work that demonstrate mastery of 21st century knowledge and skills to educators and prospective employers, and
- Enables a balanced portfolio of measures to assess the educational system's effectiveness at reaching high levels of student competency in 21st century knowledge and skills.

Educator preparation programs can play a vital role in developing education leaders who understand and can influence current trends in assessment, particularly around 21st century knowledge and skills, through efforts such as:

- Serving as a research and evaluation test bed for innovative approaches to student measurement,
- Integrating 21st century knowledge and skills assessment strategies as key components of the program's curriculum and assessments, and
- Ensuring that program graduates can demonstrate mastery of a wide range of P-12 student assessment methods to evaluate 21st century student knowledge and skills.

LEARNING ENVIRONMENTS

The learning environment within an educator preparation program is a key component of any systemic reform initiative. Determining the enabling structures, policies, and strategies that can best support 21st century knowledge and skills acquisition among teacher candidates is a first step toward creating the kind of environment that will promote this kind of learning.

The issues involving 21st century learning environments in educator preparation programs are very similar to those encountered in P-12 learning environments. Key recommendations to consider include:

- **Establish a 21st century vision for learning environments in the program and the university.** In the 21st century, the notion of a "learning environment" extends beyond brick and mortar buildings. Physical infrastructure is still vitally important, but it is also critical to attend to the technologies that supports learning (in-class and virtual). These technology tools redefine the boundaries for teaching and learning by allowing students to connect globally with other learners and with content ideas. Additionally, it is helpful to consider how the program supports the emotional, social and physical well-being of all students. By providing this kind of vision for the learning environment within the educator preparation program (and ideally throughout the institution), teacher candidates will be better prepared to engage in and support similar learning environments in the P-12 schools they enter as professionals.

- **Ensure that the physical infrastructure supports 21st century knowledge and skills.** Ideally, physical spaces are adaptable and facilitate collaboration, interaction, and information sharing; they are also accessible and open to the larger community that surrounds the school.
- **Move toward flexible units of time that enable project-based work and competency-based measures of student progress.** De-emphasize the “seat time” approach to gauging annual teacher candidate progress.
- **Ensure technical infrastructure sufficiently supports learning.** Teacher candidates benefit from up-to-date technology tools and resources, along with adequate support in learning and using these tools. Teacher candidates benefit from up-to-date technology tools and resources that connect with deeper ways of engaging with content, along with adequate support in learning and using these tools. It is an important distinction that these tools should not be seen as being separate from other pedagogical activities but rather should be deeply integrated within them.
- **Empower the “people network” in learning environments.** This is one of the most important aspects of 21st century learning environments. Although motivation is highest when teachers begin their careers in the classroom, we know that one of the main reasons that new teachers struggle in the early years of teaching is that they lack a strong mentor with whom to collaborate. Many educator preparation programs include professional learning communities and peer coaching in their programs, especially in their clinical programs, to ensure the long-term practice of continuous development through collaboration with colleagues.

In the report *Unleashing the Future: Educators “Speak Up” About the Use of Emerging Technologies for Learning*, Project Tomorrow explores the view of teachers and leaders, and future leaders (Project Tomorrow 2010). Teachers reported that as a result of using technology in the classroom students are more motivated to learn (51%), apply their knowledge to practical problems (30%) and take ownership of their learning (23%). Teachers also report that by using technology students are developing key 21st century skills including creativity (39%), collaboration (30%) and problem-solving and critical-thinking skills (27%); thus effectively preparing them for future success in the workplace. Other interesting results include:

- Only about one-quarter of responding teacher candidates report they are learning, in their teaching methods courses, how to use internet-based tools (blogs, wikis, social networking, etc.) to facilitate collaboration between students. Unfortunately, the primary skills being taught in methods courses are around the use of productivity tools, such as word processing, spreadsheet and database tools (53%).
- When asked **which experiences would best prepare them to teach in a 21st century classroom**, respondents’ top 5 choices included:
 - Learning how to use technology to differentiate instruction for students (75%)
 - Incorporating digital resources in lessons (68%)
 - Locating and using electronic teaching aides (67%)
 - Creating and utilizing video or podcasts within a lesson (57%)
 - Using electronic productivity tools (57%)

PARTNERSHIPS

Partnerships are extraordinarily important in the work of transforming 21st century educator preparation programs. For the work to be sustainable, teamwork inside the program and within the institution is, obviously, critical. But it is perhaps the partnerships that are formed between the program and the larger community outside the institution that can make the biggest impact. Target audiences for partnerships can include (but are not limited to) the following:

- Community leaders
- Business leaders
- Professional associations
- Local educational organizations
- P-12 schools
- Professional development schools
- Vendors
- Policymakers
- Parents of P-12 students

The most powerful partnerships are created in a spirit of active collaboration—where the vision for working together is not only shared, but co-created. This kind of partnering, especially when it involves a wide variety of stakeholder groups, enables true innovation around teaching and learning for the 21st century.

Leading ICT in Education Practices Toolkit

In response to the need to prepare educators who are open to new ideas and new practices around technology, a team of education professors from the Asia-Pacific region and the United States has worked in partnership with Microsoft to develop a toolkit to build the capacity of educator preparation programs to support the use of ICT for teaching, learning, and administration in schools. The “Leading ICT in Education Practices” toolkit (Lim, Chai and Churchill 2010) is being implemented in selected programs within the Asia-Pacific in early 2010.

The main objective of the toolkit is to provide a set of tools for educator preparation programs to conduct a needs and situation analysis of the state of their ICT use in teaching, learning, and administration. This toolkit proposes a framework of strategic planning processes that encompasses strategic dimensions that programs need to focus on. By attending to these strategic dimensions, educator preparation programs are more likely to generate coherent internal and external processes that enhance their capacity to develop these key competencies. This toolkit will be piloted in a handful of programs in 2010 and made available widely shortly thereafter.

CONTINUOUS IMPROVEMENT

Once education preparation leaders commit to an action plan around 21st century skills and knowledge outcomes, it is important to ask: “How can we hold ourselves accountable to this work?” and “How can we communicate progress to our constituencies?”

Continuous improvement represents a willingness to commit to revisiting the process over time, adjusting what works and what does not, and maintaining momentum. At a minimum, any implementation effort should include the following continuous improvement steps:

- Clearly identify measurable goals,
- Track progress regularly against these goals,
- Communicate progress to all stakeholders, and
- Engage all participants in refining and improving success over time.

Duquesne University School of Education

In 1995, the Duquesne University School of Education engaged in a comprehensive strategic planning process to create a teacher preparation program to serve the needs of learners in the 21st century. The effort began with focused discussions with all major stakeholders (education and liberal arts faculty, alumni, students, and school professionals/ community members) who responded to five questions:

- What must children of the 21st century know?
- What are the essential characteristics of highly effective professional educators for the 21st century?
- What are the essential knowledge, skills and values for professional educators?
- What are the essential characteristics of programs to produce effective professional educators for the 21st century?
- What are the elements of a curriculum to prepare professionals for the 21st century?

The outcome of this strategic process was the undergraduate “Leading Teacher Program” (LTP) which was designed by cross-departmental committees and was reviewed and approved by the Teacher Education Council (a cross-representational group including school, university, and community members) and implemented in 2001. The design of the LTP conceptual framework focused on three themes (leadership, technology, and diversity) and five domains (learning theorist, curriculum designer, school context expert, master practitioner, instructional leader) and a curriculum based on NCATE, INTASC; and state standards. The design featured rigorous admissions criteria with gateway and benchmark assessments throughout, an academic cognate to strengthen content knowledge, six credits of infused special education courses, extensive field experience in seven of eight semesters, a professional development schools initiative, and a capstone student teaching portfolio requiring evidence of candidate impact on student learning. A comprehensive candidate assessment system was created, providing a database to track student and program performance. In 2006, the School of Education received full accreditation from NCATE, and the candidate assessment system was recognized at the 2007 AACTE Annual Meeting. In the past two years, the infusion of special education competencies has increased, and competencies were added for teaching English language learners based on state requirements.

Since 2001, the Duquesne University School of Education has engaged in a process of continuous improvement and building a vision based on our identity of “preparing educational leaders and scholarship for schools in the Spiritan tradition of caring.” It is now poised to conduct a critical review of the conceptual framework and design of the Leading Teacher Program and to define an urban education initiative focused on social justice and excellence in teacher preparation.

GETTING STARTED

How can educator preparation leaders get started? To begin, consider these suggestions:

1. Identify the leadership team and establish consensus around a vision for transforming your program to meet the needs of 21st century learners.
2. Review the guiding questions in the chart below and use them to generate action-oriented discussion among the leadership team.
3. Develop a prioritized implementation plan that is drawn from, but is not necessarily limited to, the questions outlined below.
4. Develop a robust group of stakeholders within and outside the program to assist with implementation, feedback, and continuous improvement.

CATEGORY	GUIDING QUESTIONS
Leadership	<ul style="list-style-type: none"> • Does the vision for educator preparation call for student mastery of core academic content knowledge along with 21st century skills (e.g., critical thinking, problem solving, communication and collaboration)? • Is there consensus within the university, college, program and/or other stakeholders around the vision for educator preparation? • Has a thorough needs assessment and/or gap analysis been conducted around educator preparation and 21st century knowledge and skills? • Are program goals, strategies, content and processes aligned to support educators in teaching for 21st century knowledge and skills outcomes? • Does the program promote and support research and evaluation of 21st century education? • Has the program created advisory groups with key stakeholders? • Does the program have a system for hiring, developing, retaining and rewarding faculty who include 21st century knowledge and skills in their teaching repertoire? • Does the program have a system for recruiting and selecting candidates in part based on their interest in 21st century knowledge and skills?
Curriculum and Instruction	<ul style="list-style-type: none"> • Does the program have a coherent approach to integrating 21st century knowledge and skills into the program's curriculum? • Does the program provide extensive clinical experience opportunities that are grounded in the practice of teaching not only academic subjects but also applied student mastery of 21st century knowledge and skills? • Does the program's curriculum leverage current technologies (as described in the TPCK framework) in order to enhance technology-enabled collaboration and mentoring among teacher candidates? • Does the program incorporate inquiry-based experiences that allow graduates to connect theories of teaching and learning around 21st century knowledge and skills into practice?

CATEGORY	GUIDING QUESTIONS
Assessment	<ul style="list-style-type: none"> • Does the program ensure that every candidate is evaluated on her/his ability to think critically, problem solve, communicate and collaborate, and use teaching strategies that will facilitate the development of these skills in their prospective students? • Do teacher candidates receive timely assessment feedback in order to reflect on and refine their own learning? • Are teacher candidates evaluated on their ability to demonstrate skills such as their integration of technology into practice? • Are teacher candidates encouraged to develop portfolios that demonstrate mastery of 21st century knowledge and skills? • Does the program engage in research and development around performance-based assessments that measure 21st century knowledge and skills? • Are faculty engaged in the creation of rubrics to help guide and manage the program's progress in this area?
Learning Environments	<ul style="list-style-type: none"> • Are physical spaces open, accessible, flexible and adaptable so that they enable collaboration, interaction and information sharing and collaboration with the larger community (particularly the local P-12 schools)? • Does the program use flexible units of time that enable project-based work, interdisciplinary themes and competency-based measures of student progress? • Is there sufficient technical infrastructure to support student learning? Is this infrastructure sufficiently open to global resources? For example, do teacher candidates have access to up-to-date technology tools and resources, along with adequate support in learning and using these tools for deep learning in all subject areas? • Does the program support peer coaching, mentoring, and technology-enabled learning communities?
Partnering	<ul style="list-style-type: none"> • Do robust and active partnerships exist between the program and other entities such as: <ul style="list-style-type: none"> - Other colleges within the university - Stakeholders outside of the institution: community leaders, business leaders, professional associations, local educational organizations - Other stakeholders that may be geographically separated but share a similar vision - P-12 schools - Professional development schools - Vendors - Policymakers - Parents of P-12 students • Are there any partnerships that specifically reinforce 21st century knowledge and skills outcomes among candidates?
Continuous Improvement	<ul style="list-style-type: none"> • Does the educator preparation program's strategic planning and budget include a 21st century skills initiative as a key imperative? • Does the program monitor and track success over time at enabling candidates to master the teaching of all content areas and 21st century knowledge and skills? • Does the program honor and promote 21st century skills best practices among candidates? • Does the program use a balanced mix of accountability data along with other indicators to drive continuous program improvements around 21st century skills?

CONCLUSION

In the 21st century, all educators play a significant role in shaping the lives and careers of their students. When teaching and learning is at its best, our students, our communities; and our nation thrive. Educator preparation leaders are right to challenge themselves with the question: “What is our role in the changing landscape of 21st century knowledge and skills?”

In this paper, we hope to confirm the important role these programs play in developing effective, engaged educators that, in turn, can improve outcomes for all P-12 students. If educator preparation leaders come together to define and implement approaches that support the teaching and learning of 21st century knowledge and skills in more purposeful ways, we all benefit.

We recognize that this is extraordinarily difficult work. It requires expanding the vision of what it means to prepare educators for their future roles. And it takes dedicated planning, strategic consensus-building, systemic alignment; and robust partnerships to be effective and sustainable.

The collective leadership of the educator preparation community can play a major role in establishing this agenda, providing powerful models of support, and establishing promising practices for success. We hope that the conversations generated by this report will help all programs begin or, indeed, continue the dialogue and collaboration that leads to a better future for all of our nation’s students.

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Appendix A

P21 Framework Definitions

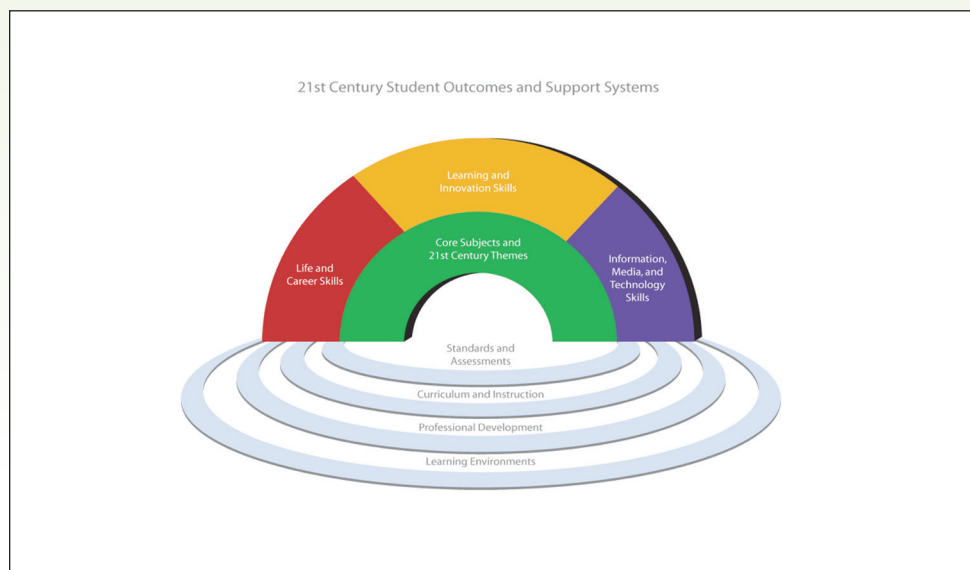
To help practitioners integrate skills into the teaching of core academic subjects, the Partnership has developed a unified, collective vision for learning known as the Framework for 21st Century Learning. This Framework describes the skills, knowledge and expertise students must master to succeed in work and life; it is a blend of content knowledge, specific skills, expertise and literacies.

Every 21st century skills implementation requires the development of core academic subject knowledge and understanding among all students. Those who can think critically and communicate effectively must build on a base of core academic subject knowledge.

Within the context of core knowledge instruction, **students must also learn the essential skills for success in today's world, such as critical thinking, problem solving, communication and collaboration.**

When a school or district builds on this foundation, combining the entire Framework with the necessary support systems—standards, assessments, curriculum and instruction, professional development and learning environments—students are more engaged in the learning process and graduate better prepared to thrive in today's global economy.

While the graphic represents each element distinctly for descriptive purposes, the Partnership views all the components as fully interconnected in the process of 21st century teaching and learning.



Appendix B

21st CENTURY STUDENT OUTCOMES

The elements described in this section as “21st century student outcomes” (represented by the rainbow) are the knowledge, skills and expertise students should master to succeed in work and life in the 21st century.

CORE SUBJECTS AND 21st CENTURY THEMES

Mastery of **core subjects and 21st century themes** is essential for all students in the 21st century. Core subjects include:

- English, reading or language arts
- World languages
- Arts
- Mathematics
- Economics
- Science
- Geography
- History
- Government and civics

In addition to these subjects, we believe schools must move to not only include a focus on mastery of core subjects, but also promote understanding of academic content at much higher levels by weaving **21st century interdisciplinary themes** into core subjects:

Global Awareness

- Using 21st century skills to understand and address global issues
- Learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue in personal, work and community contexts
- Understanding other nations and cultures, including the use of non-English languages

Financial, Economic, Business and Entrepreneurial Literacy

- Knowing how to make appropriate personal economic choices
- Understanding the role of the economy in society
- Using entrepreneurial skills to enhance workplace productivity and career options

Civic Literacy

- Participating effectively in civic life through knowing how to stay informed and understanding governmental processes
- Exercising the rights and obligations of citizenship at local, state, national and global levels
- Understanding the local and global implications of civic decisions

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Health Literacy

- Obtaining, interpreting and understanding basic health information and services and using such information and services in ways that enhance health
- Understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance and stress reduction
- Using available information to make appropriate health-related decisions
- Establishing and monitoring personal and family health goals
- Understanding national and international public health and safety issues

Environmental Literacy

- Demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water and ecosystems
- Demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.)
- Investigate and analyze environmental issues, and make accurate conclusions about effective solutions
- Take individual and collective action towards addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues)

LEARNING AND INNOVATION SKILLS

Learning and innovation skills increasingly are being recognized as those that separate students who are prepared for a more and more complex life and work environments in the 21st century, and those who are not. A focus on creativity, critical thinking, communication and collaboration is essential to prepare students for the future.

CREATIVITY AND INNOVATION

Think Creatively

- Use a wide range of idea creation techniques (such as brainstorming)
- Create new and worthwhile ideas (both incremental and radical concepts)
- Elaborate, refine, analyze and evaluate their own ideas in order to improve and maximize creative efforts

Work Creatively with Others

- Develop, implement and communicate new ideas to others effectively
- Be open and responsive to new and diverse perspectives; incorporate group input and feedback into the work
- Demonstrate originality and inventiveness in work and understand the real world limits to adopting new ideas

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- View failure as an opportunity to learn; understand that creativity and innovation is a long-term, cyclical process of small successes and frequent mistakes

Implement Innovations

- Act on creative ideas to make a tangible and useful contribution to the field in which the innovation will occur

CRITICAL THINKING AND PROBLEM SOLVING

Reason Effectively

- Use various types of reasoning (inductive, deductive, etc.) as appropriate to the situation Use Systems Thinking
- Analyze how parts of a whole interact with each other to produce overall outcomes in complex systems

Make Judgments and Decisions

- Effectively analyze and evaluate evidence, arguments, claims and beliefs
- Analyze and evaluate major alternative points of view
- Synthesize and make connections between information and arguments
- Interpret information and draw conclusions based on the best analysis
- Reflect critically on learning experiences and processes

Solve Problems

- Solve different kinds of non-familiar problems in both conventional and innovative ways
- Identify and ask significant questions that clarify various points of view and lead to better solutions

COMMUNICATION AND COLLABORATION

Communicate Clearly

- Articulate thoughts and ideas effectively using oral, written and nonverbal communication skills in a variety of forms and contexts
- Listen effectively to decipher meaning, including knowledge, values, attitudes and intentions
- Use communication for a range of purposes (e.g. to inform, instruct, motivate and persuade)
- Utilize multiple media and technologies, and know how to judge their effectiveness a priori as well as assess their impact
- Communicate effectively in diverse environments (including multi-lingual)

Collaborate with Others

- Demonstrate ability to work effectively and respectfully with diverse teams

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- Exercise flexibility and willingness to be helpful in making necessary compromises to accomplish a common goal
- Assume shared responsibility for collaborative work, and value the individual contributions made by each team member

INFORMATION, MEDIA AND TECHNOLOGY SKILLS

People in the 21st century live in a technology and media-suffused environment, marked by various characteristics, including: 1) access to an abundance of information, 2) rapid changes in technology tools, and 3) the ability to collaborate and make individual contributions on an unprecedented scale. To be effective in the 21st century, citizens and workers must be able to exhibit a range of functional and critical thinking skills related to information, media and technology.

INFORMATION LITERACY

Access and Evaluate Information

- Access information efficiently (time) and effectively (sources)
- Evaluate information critically and competently

Use and Manage Information

- Use information accurately and creatively for the issue or problem at hand
- Manage the flow of information from a wide variety of sources
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information

MEDIA LITERACY

Analyze Media

- Understand both how and why media messages are constructed, and for what purposes
- Examine how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors
- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of media

Create Media Products

- Understand and utilize the most appropriate media creation tools, characteristics and conventions
- Understand and effectively utilize the most appropriate expressions and interpretations in diverse, multi-cultural environments

ICT (Information, Communications and Technology) LITERACY

Apply Technology Effectively

- Use technology as a tool to research, organize, evaluate and communicate information
- Use digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access,

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manage, integrate, evaluate and create information to successfully function in a knowledge economy

- Apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies

LIFE AND CAREER SKILLS

Today's life and work environments require far more than thinking skills and content knowledge. The ability to navigate the complex life and work environments in the globally competitive information age requires students to pay rigorous attention to developing adequate life and career skills.

FLEXIBILITY AND ADAPTABILITY

Adapt to Change

- Adapt to varied roles, jobs responsibilities, schedules and contexts
- Work effectively in a climate of ambiguity and changing priorities

Be Flexible

- Incorporate feedback effectively
- Deal positively with praise, setbacks and criticism
- Understand, negotiate and balance diverse views and beliefs to reach workable solutions, particularly in multi-cultural environments

INITIATIVE AND SELF-DIRECTION

Manage Goals and Time

- Set goals with tangible and intangible success criteria
- Balance tactical (short-term) and strategic (long-term) goals
- Utilize time and manage workload efficiently

Work Independently

- Monitor, define, prioritize and complete tasks without direct oversight

Be Self-directed Learners

- Go beyond basic mastery of skills and/or curriculum to explore and expand one's own learning and opportunities to gain expertise
- Demonstrate initiative to advance skill levels towards a professional level
- Demonstrate commitment to learning as a lifelong process
- Reflect critically on past experiences in order to inform future progress

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SOCIAL AND CROSS-CULTURAL SKILLS

Interact Effectively with Others

- Know when it is appropriate to listen and when to speak
- Conduct themselves in a respectable, professional manner

Work Effectively in Diverse Teams

- Respect cultural differences and work effectively with people from a range of social and cultural backgrounds
- Respond open-mindedly to different ideas and values
- Leverage social and cultural differences to create new ideas and increase both innovation and quality of work

PRODUCTIVITY AND ACCOUNTABILITY

Manage Projects

- Set and meet goals, even in the face of obstacles and competing pressures
- Prioritize, plan and manage work to achieve the intended result

Produce Results

- Demonstrate additional attributes associated with producing high quality products including the abilities to:
 - Work positively and ethically
 - Manage time and projects effectively
 - Multi-task
 - Participate actively, as well as be reliable and punctual
 - Present oneself professionally and with proper etiquette
 - Collaborate and cooperate effectively with teams
 - Respect and appreciate team diversity
 - Be accountable for results

LEADERSHIP AND RESPONSIBILITY

Guide and Lead Others

- Use interpersonal and problem-solving skills to influence and guide others toward a goal
- Leverage strengths of others to accomplish a common goal
- Inspire others to reach their very best via example and selflessness
- Demonstrate integrity and ethical behavior in using influence and power

Be Responsible to Others

- Act responsibly with the interests of the larger community in mind

21st CENTURY SUPPORT SYSTEMS

The elements described below are the critical systems necessary to ensure student mastery of 21st century skills. 21st century standards, assessments, curriculum, instruction, professional development and learning environments must be aligned to produce a support system that produces 21st century outcomes for today's students.

21st Century Standards

- Focus on 21st century skills, content knowledge and expertise
- Build understanding across and among core subjects as well as 21st century interdisciplinary themes
- Emphasize deep understanding rather than shallow knowledge
- Engage students with the real world data, tools and experts they will encounter in college, on the job, and in life; students learn best when actively engaged in solving meaningful problems
- Allow for multiple measures of mastery

Assessment of 21st Century Skills

- Supports a balance of assessments, including high-quality standardized testing along with effective formative and summative classroom assessments
- Emphasizes useful feedback on student performance that is embedded into everyday learning
- Requires a balance of technology-enhanced, formative and summative assessments that measure student mastery of 21st century skills
- Enables development of portfolios of student work that demonstrate mastery of 21st century skills to educators and prospective employers
- Enables a balanced portfolio of measures to assess the educational system's effectiveness in reaching high levels of student competency in 21st century skills

21st Century Curriculum and Instruction

- Teaches 21st century skills discretely in the context of core subjects and 21st century interdisciplinary themes
- Focuses on providing opportunities for applying 21st century skills across content areas and for a competency-based approach to learning
- Enables innovative learning methods that integrate the use of supportive technologies, inquiry- and problem-based approaches and higher order thinking skills
- Encourages the integration of community resources beyond school walls

Appendix C

21st Century Professional Development

- Highlights ways teachers can seize opportunities for integrating 21st century skills, tools and teaching strategies into their classroom practice — and help them identify what activities they can replace/de-emphasize
- Balances direct instruction with project-oriented teaching methods
- Illustrates how a deeper understanding of subject matter can actually enhance problem-solving, critical thinking, and other 21st century skills
- Enables 21st century professional learning communities for teachers that model the kinds of classroom learning that best promotes 21st century skills for students
- Cultivates teachers' ability to identify students' particular learning styles, intelligences, strengths and weaknesses
- Helps teachers develop their abilities to use various strategies (such as formative assessments) to reach diverse students and create environments that support differentiated teaching and learning
- Supports the continuous evaluation of students' 21st century skills development
- Encourages knowledge sharing among communities of practitioners, using face-to-face, virtual and blended communications
- Uses a scalable and sustainable model of professional development

21st Century Learning Environments

- Create learning practices, human support and physical environments that will support the teaching and learning of 21st century skill outcomes
- Support professional learning communities that enable educators to collaborate, share best practices and integrate 21st century skills into classroom practice
- Enable students to learn in relevant, real world 21st century contexts (e.g., through project-based or other applied work)
- Allow equitable access to quality learning tools, technologies and resources
- Provide 21st century architectural and interior designs for group, team and individual learning
- Support expanded community and international involvement in learning, both face-to-face and online

