

PARTNERSHIP FOR 21ST CENTURY SKILLS

21st Century Learning Environments

21st CENTURY LEARNING ENVIRONMENTS

INTRODUCTION

This white paper has been created to provide an overview of research and expert opinion on 21st century learning environments, one of the four support systems in the Partnership's 21st Century Skills Framework. Its purpose is to offer a descriptive view of the places, tools, people, and policies that make up 21st century learning environments and, we hope, inspire its readers to work towards their realization. To further guide schools and communities in designing dynamic 21st learning environments, the Partnership's Resource 21 site provides a wealth of information on this and other Framework elements at <http://www.21stcenturyskills.org/route21/>.

What is a 21st century learning environment?

The term "learning environment" suggests place and space – a school, a classroom, a library. And indeed, much 21st century learning takes place in physical locations like these. But in today's interconnected and technology-driven world, a learning environment can be virtual, online, remote; in other words, it doesn't have to be a place at all. Perhaps a better way to think of 21st century learning environments is as the support systems that organize the condition in which humans learn best – systems that accommodate the unique learning needs of every learner and support the positive human relationships needed for effective learning. Learning environments are the structures, tools, and communities that inspire students and educators to attain the knowledge and skills the 21st century demands of us all.

Experts say 21st century learning must take place in contexts that "promote interaction and a sense of community [that] enable formal and informal learning."¹ Thus, this paper will address the relationship of physical spaces and technological systems to learning, but more importantly, it will also consider how those resources support the positive *human relationships* that matter most to learning. And while technology, space, time, culture, and policy will be discussed separately, it is important to remember that their power is cumulative.

21st century learning environment as an aligned and synergistic *system of systems* that:

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

Such an environment fosters learning tailored to the needs and wants of the individual. This sort of learning occurs anytime and anyplace, when and where the learner desires. It takes place in a context of relevance, "just in time," rather than "just in case." And such learning offers "just what I need" – that is, the opportunity to acquire knowledge and skills through learning strategies that are personalized and adapted to the learner's own learning styles and preferences. To guide policymakers, educational authorities, and school leaders, the Partnership has prepared this white paper to promote the vibrant educational environments – physical and online, technological and human – that support the 21st century learning all children deserve.

really makes a difference. While the building alone does not make a 21st century school, common sense suggests that the qualities of *where* we learn affect the quality of *how* we learn. Georgetown University researchers, for instance, have found that improving a school's physical environment can increase test scores by up to 11%.^{vii}

The Organisation for Economic Co-operation and Development (OECD) has considered learning needs around the globe in recommending that schools "accommodate both the known and identifiable needs of today, and the uncertain demands of the future. They should provide an environment that will support and enhance the learning process, encourage innovation, foster positive human relationships--in short, be 'a tool for learning.'"^{viii} So what does such an environment look like?

For one thing, 21st century learning spaces will not all look alike. The industrial era's cookie-cutter approach to school design does not map well to today's multifaceted educational needs. Instead, schools and other places of learning must to reflect our understanding of how people learn. In a recent AAF white paper, former principal Elizabeth Lodal notes that today's students "...need to be inspired to become creative problem solvers and intellectual risk takers so that they are prepared for the world of the 21st century. School design will either inhibit or support and enhance such a robust education program."^{ix} And while every school will reflect the unique needs of its community, there are sound design principles to guide the creation of learning environments that truly promote kind of education on which 21st century students will thrive.

Designs for Learning

Perhaps the most fundamental guideline is "design for flexibility." Since no one can predict how educational technologies and teaching modalities will evolve, learning spaces must adapt to whatever changes the future may hold. To achieve this flexibility, architects are designing classrooms, or "learning studios," with moveable furniture and walls that can easily be reconfigured for different class sizes and subjects.^x The school building itself should inspire intellectual curiosity and promote social interactions. DesignShare, an organization devoted to sharing best practices and innovation in schools,^{xi} sponsors an annual awards program to recognize outstanding school design across the world.

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Connecting with the Wider World

Over a century ago John Dewey, the noted American philosopher and educator, observed that learning that endures is “got through life itself.” While the physical space of many 21st century learning environments may be small, the learning they engender extends out into the local community and the world at large. Students and community members may work together on service projects and internships. Learners may connect with their peers across the globe to share data on a common problem like climate change or wildlife preservation. Teachers and students may seek the advice of world-renowned experts to guide them in their inquiry-based projects. Technology obviously enables such connections, but physical structure, too, can play an important role in facilitating these essential 21st century learning experiences.

According to the American Architectural Foundation, one way to do this is through innovative sharing of space with the school’s local community, such as making performance spaces and meeting rooms available to the general public.^{xiii} Some communities are establishing pre-school daycare or senior centers within school facilities and developing programs that bring students together in meaningful ways with those much younger or older than they. Such an effort can include scheduling classes at different times (not just between the hours of 8 and 3), as well as going beyond to include homework support and mentoring, intergenerational gatherings, and more. Schools must become community centers with hours that extend well beyond the current school day to provide access to technology resources, recreational activities, and health services.^{xiv} Such collaborative arrangements can offset costs for all stakeholders while creating year-round multi-generational learning places that enrich relationships among community members.

Architects and school planners strongly suggest that educators seek input from the community when designing a new school or undertaking a major renovation of an existing structure.^{xv} Having an effective process for gathering and reflecting on public opinions and needs will result in greater buy-in for the plan, and, ultimately, greater support for the resulting buildings. Students, too, are critical

community members, encouraging everyone to “think green” in all areas of their lives.^{xix} A wonderful example is found at St. Pancras Primary School in southern England, where students have turned the building of a new environmentally sustainable addition into an opportunity to learn 21st century skills. By documenting the planning and construction process, students are deepening their understanding of environmental issues, while gaining IT and video production expertise and honing their narrative skills by documenting their compelling story.^{xx}

But in many communities building from scratch is not an option. What can be done about school buildings that already exist? Many urban districts are finding that renovation of older buildings can be an attractive and environmentally sensitive option to building anew.^{xxi} Historic school buildings often make effective use of natural resources like light and ventilation simply because modern energy-consuming options like air conditioning were not available at the time of construction. Successful renovations can also revitalize the surrounding neighborhoods, providing a focal point for community life, while leveraging strategic locations and existing public transportation options.

Re-conceiving the Library

Twenty-first century design is also influencing another traditional learning space – the school library. As more and more content moves into virtual form, many schools are wondering how the library should respond. Yet even as information becomes digital, kids still need space, says Julie Walker, the executive director of the American Association of School Librarians (AASL). The library media center should be the nerve center of the school, a place where kids gather to get *and* create information, a place where they can get excited about learning *and* where they can escape from the pressures of the day.

The 21st century library media center must play multiple roles: carrying out its traditional role of bringing information resources to learners, of course, but also providing the tools and infrastructure that enable learners to analyze, synthesize, and evaluate resources in ways that demonstrate learning and create new knowledge. It must offer places for formal learning in which large groups can gather for presentations; places for social learning where teams can collaborate on projects; and places for individual learning where individuals can

TIME FOR LEARNING

Flexibility of design needs to extend to time as well. Twenty-first century learning cannot fully flower when embedded in a rigid 19th century calendar. More malleable units of time than the typical 50-minute class period are required for project-based work or interdisciplinary themes. Many schools are turning to block scheduling to create bigger, more adjustable time slots for student learning, and for teaching planning and professional development.

But these are just the first steps in taking a 21st century approach to time. Schools must also move away from the antiquated notion of “seat time” – that is, measuring academic accomplishment by the amount of time spent *on* the topic, rather than a demonstration of *what* was learned. One marker whose time is up is the Carnegie unit, used by high schools calculate how much time students should spend on a given subject. In 2006, the ASCD’s High School Reform Proposal noted that schools are currently “hindered by inflexible graduation, time and attendance requirements, such as the 100-year-old Carnegie unit, that do not reflect contemporary knowledge of best practices.”^{xxiii}

Eliminating time-based measures of academic achievement means that assessment practices must change, too. Two states are leading the way. New Hampshire, the first state to eliminate the Carnegie unit requirement, will instead assess student achievement through demonstrations of subject matter mastery and application. Rhode Island now uses the term ‘Carnegie unit’ to refer to courses that are evaluated on competence measures rather than seat time. Both states are linking these new measures of time with new 21st century assessment policies that “emphasize real-world learning and allow students to pursue alternative approaches outside the classroom to acquire knowledge and skills.”^{xxiv}

Establishing time during the day for collaboration and planning is another way to advance 21st century teaching practice. In earlier eras, teachers had little structured time during the day for interaction with other adults. Today, though, the challenges of preparing all students for success require the collaborative efforts of all the professionals in a school. To ensure that this time is used productively, school leaders at Upper Merion Area Middle School in Pennsylvania have developed a

environments promote this integration of formal and informal learning, for “when it comes to learning, there is no final bell.”^{xxix}

TOOLS FOR LEARNING

What technological infrastructures best support the teaching and learning of 21st century skills?

Students today need access to the digital tools and media-rich resources that will help them explore, understand, and express themselves in the world they will inherit tomorrow. Educators need access to tools and resources to share knowledge and practice with other professionals, interact with experts in their field, and connect with their students’ families and communities. Administrators need access to these same tools and resources to manage the complexities of the educational enterprise – from student records and performance data, to personnel management and facilities operations. A robust infrastructure, designed for flexibility and growth, can facilitate these connections – and more. The essential goal of technology, as it is with all systems for learning, is to support people’s relationships to each other and their work. As in planning any complex task, infrastructure design must be approached with one eye on today’s practical realities, and the other on tomorrow’s opportunities.

A Seamless Interface

A 21st century learning environment blends physical and digital infrastructures to seamlessly support learning. Melding face-to-face with online learning is essential for schools today, but wise educators know achieving such a goal takes careful planning. All too often, school officials approach technology planning with trepidation. The choices can seem overwhelming, and mistakes can be costly. What can educational leaders do to avoid missteps?

Perhaps the greatest challenge of educational technology is not finding time and money to obtain hardware or software, or even in anticipating future needs, but in finding ways to *adequately support*

needs and resources of their state, district, or school. Having a clearly articulated instructional strategy is essential for sorting through the possibilities and making informed decisions. As a CoSN brief reminds readers, “technology is not the end goal – it is but one component in an educational program.”^{xxxviii} It is how we use it that counts. Towards that end, what follows are some of the most notable ways that technology can enhance student learning and promote mastery of 21st century skills:

1. *Promoting greater student achievement:* According to a Cisco research review of seven major technology types, ranging from instructional TV to distance learning: “Overall, across all uses in all content areas, technology does provide a small, but significant, increase in learning when implemented with fidelity.”^{xxxix} To achieve positive results, educators are urged to seek out research-proven applications, and to pay close attention to aligning technology with leadership and staff development, teacher preparation, school culture, and curricular redesign.
2. *Increasing student engagement:* The Consortium for School Networking points out that “the allure of engrossing digital tools, entertaining experiences and social networking communities outside of school is making it increasingly difficult for educators to motivate and engage a large majority of students in academic learning with traditional pedagogy. Schools must create learning environments that are as engaging and relevant as the ones that students gravitate to outside of school.”^{xi} Research also shows that students are more engaged and more successful when they can connect what they are learning to situations they care about in their community and in the world.^{xii} Technology provides access to real-world data, tools, and resources, and can help students link learning to life.
3. *Assessing student performance:* Many schools are recognizing the value of employing an assessment strategy that balances both summative and formative assessments. Technology can help with both types by providing educators with real time diagnostic information that deepens understanding of student learning gains and challenges.^{xiii} Student performance tracking systems can enhance instructional decision making by helping

programs, tools for creative expression, and many, many more. Life and career skills are honed by students' experiences with communication, presentation, and productivity technologies. And of course, information, communication, and media literacy – a vital 21st skill area – is founded on helping students make wise use of the many technologies that so shape modern life.

Students Supporting Technology

Networks and devices need maintenance to stay robust and current. Individuals need training and ongoing support to maximize technology's benefits. Yet, cash-strapped school systems are often unable to compete with the private sector for scarce technical support personnel. Creative school systems have turned this problem into a 21st century learning opportunity by establishing programs like MOUSE,^{xlvii} that organize and train student-led squads to provide much of the technical support in their schools. Students learn valuable technical skills, while also honing other critical workforces skills like teamwork, project planning, and time management. Such programs have paid off in valuable corporate internships for their young participants, and even more importantly, in their enhanced self-confidence and capacity for leadership.

Guiding Principles for Technology Planning

Despite the fast pace which seems to be associated with everything technological, experts advise educators to *slow down* when making critical technology decisions. Leaders are encouraged to use those critical thinking skills: examine assumptions, gather data from many sources, envision alternative scenarios, then make an informed choice. In these days of tight resources and high expectations, technology planning must be approached intelligently.

Technology planners find it useful to adopt a *baseline strategy*. For many districts, it is not feasible to outfit its entire population with the latest digital technology. In such cases, it makes sense to first equip all classroom teachers with the 21st century tools they need for instructional and professional effectiveness. At minimum, every educator should have a laptop with high-bandwidth connectivity to the Internet, access to standard productivity tools, and academic and administrative applications appropriate to local needs. Each classroom should also have projector or whiteboard for in-class display of the teacher's laptop.^{xlviii} The school library media center should, at

can conduct online assessments and retrieve data to facilitate decision making; teachers can tap into educational portals and curriculum-resource sites; and all learners can benefit when school, public, and academic libraries share electronic resources. With high-speed broadband, educators, students, and families can fully experience media-rich educational resources and participate in anytime/anywhere learning communities. The report notes that broadband access is especially critical in overcoming the digital divide in rural and low socio-economic areas.¹

In addition to local area networks, states and countries need to consider deployment of a broadband network linking schools together with their central administration or ministry of education. It may also be advantageous to link such a broadband network to higher education institutions, thereby creating national research and education networks. Data centers, located on the broadband network and centrally running multiple academic and administrative applications, can enable economies of scale and lower servicing costs across a number of educational institutions, while facilitating research, scholarship, and learning at all levels.

COMMUNITIES FOR LEARNING

What types of relationships and communities nurture 21st century learning, and how can we create and sustain them?

From Isolation to Connection

So far, we have considered how buildings, schedules, and technology all contribute to 21st century learning. Now we come to the most essential of element of all: the "people network." This is the community of students, educators, parents, business and civic leaders, and policymakers that constitute the human resources of an educational system. The flexible spaces that enable productive learning and shared work/play opportunities, the creative uses of time that promote continuous learning, the extensible technologies that support collaboration among the school community and the outside

strong evidence, as well, that greater community and parental participation yields important educational advantages. The George Lucas Foundation cites numerous studies showing that strong home-school connections result in the following outcomes:

- Children do better in school when their parents are involved in their education
- After-school learning opportunities promote student achievement
- Community youth development programs spur academic performance
- Schools that integrate community services reduce risk and promote resilience in children^{lvi}

Strategies for Healthy Communities

Accountability: Inside and Out

Today, we hear a lot about accountability in education. Generally, this is understood to be a system of external measurement – often accompanied by sanctions for non-performance – designed to ensure that a school system meets the expectations of external stakeholders like the general public, employers, or parents. Such accountability systems have their place in helping schools track the progress of the students in their care, and in enabling educators to monitor school progress, spurring them to greater achievement.

But there is another form of accountability that may be a more reliable source of organizational commitment and a more consistent wellspring of innovation. What leading educator Richard Elmore calls *internal accountability*^{lvii} is fostered from inside the school organization, and stems from within each member of the community. Internal accountability occurs when professional conceptions of responsibility are aligned with deep personal values to forge a common vision. Successful schools, Elmore has found, conceive of accountability less as externally driven carrots and sticks, and more as an internally motivated sense of purpose and mission.

Internal accountability changes the view of “agency” or locus of control from a top-down rules-driven process to a decision-making framework that all community members understand and help shape. On the organizational level, this shift is analogous to what goes on at the instructional level as 21st century schools move away from the

apprenticeship. To provide the guidance and support that new teachers need, the National Commission for Teaching and America's Future (NCTAF) recommends that schools establish cross-generational staffing programs – professional arrangements that pair experienced and novice educators with each other. New entrants gain valuable insights from lessons learned, while their seasoned partners are respected for their experience and reenergized by the connection to young talent.

Leadership for Learning

As educational organizations grow more diverse, they grow more complex. Good leadership is essential to organize this variety productively. Leadership expert Michael Fullan states, "Almost every single study of school effectiveness has shown both primary and secondary leadership to be a key factor."^{ixii} A key role for 21st century leaders, according to Eleanor Drago-Severson, is establishing a culture of shared leadership, collegial relationships, and support for constructive change and diversity. Such a climate encourages the professional growth of educators, which in turn enhances student achievement.^{ixiii} Successful school leaders are those who focus on student learning, provide support for professional communities, are "outward looking" (in seeking ideas and connections outside the school), and "demonstrate caring for the well-being and whole development of students and staff."^{ixiv}

Not surprisingly, when it comes to learning, adults benefit from many of the same supports that children do, including access to up-to-date technology, and well-designed space and time for reflection, collaboration, and decision-making. Adults, too, benefit from school cultures that promote shared goals and accountability, productive interaction, and reliable measures of effectiveness. As Tom Carroll, NCTAF's director notes, in earlier eras, schools saw themselves as organizations focused on maximizing *teaching* effectiveness. In the 21st century, schools must be communities that maximize *learning* effectiveness.^{ixv}

Community Partnerships

Educational partnerships within the extended community are essential in creating links to the arenas that the today's youth will occupy tomorrow – the domains of higher education institutions, the work place, various cultural spheres, and civic life. Schools and higher

the 2001 No Child Left Behind Act. Local policies abound as well, as district- and building-level officials determine how to implement state and federal policy. Because policymaking happens on multiple levels, local officials face the challenge of making sense of a host of rules, regulations, and standards that are not always well aligned, and at times, even conflict with one another.

Having a clear sense of overarching objectives can help with alignment. When policies are aimed at the same goals, conflicts among them are reduced. So, as in any planning process, the first step in creating good educational policy is articulating what education should accomplish. There is growing recognition among educators, civic leaders, business leaders, and the general public that today's youth will inherit a world that is far more dynamic and complex than it was even a few decades ago. The kind of education that prepared today's citizens will not serve the needs of tomorrow's.

Citizens of the 21st century need to think critically and creatively, embrace diversity and ambiguity, and create as well as consume information. They need to be resourceful and self-reliant, while also skilled at collaboration and group process. They need to understand the many "languages" of modernity – such as mathematics, science, and technology – and be fluent in varied forms of communication – such as persuasion, presentation, and self-expression.

Advances in telecommunications and digital technologies can enable much of this learning, but it is just as important for policy makers to build on recent gains in our understanding of human learning. Research shows, time and time again, that tools are only as effective as the tool users. So along with sophisticated architectures of physical sites and technology infrastructures must come support for human growth and development for the adults as well as children that these architectures support.

We must re-design schools that reach far beyond the traditional classrooms many adults experienced when they were young. The learning environments of the 21st century must encompass a rich mix of media and devices, varied cultures, and virtual and real-life relationships. Policy must serve as the steering mechanism to guide the creation of learning environments that are both more expansive and more inclusive – spaces for learning that offer more people more



PARTNERSHIP WITH PARENTS: COMMUNITY SKILLS

introduces and trains each child of society into membership within such a little community, saturating him with spirit of service, and providing him with the instruments of effective self-direction, we shall have the deepest and best guarantee of a larger society which is worthy, lovely, and harmonious."^{lxvi}

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