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A New Era of Education Reform:
Preparing All Students for Success in College, Career and Life

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The Rennie Center's mission is to develop a public agenda that informs and promotes significant improvement of public education in Massachusetts. Our work is motivated by a vision of an education system that creates the opportunity to educate every child to be successful in life, citizenship, employment and life-long learning. Applying nonpartisan, independent research, journalism and civic engagement, the Rennie Center is creating a civil space to foster thoughtful public discourse to inform and shape effective policy. For more information, please visit www.renniecenter.org.

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Introduction

As society changes, the knowledge and skills required for citizens to navigate the complexities of life and work must also change. As a result, some argue that schools must provide students with a broader set of skills that will enable them to thrive in our increasingly diverse, rapidly evolving and globally-connected world. While others maintain that as long as a portion of the student population is not mastering basic reading, writing and mathematics skills, schools must continue to focus exclusively on the traditional core academic disciplines. In an effort to inform this debate, the Rennie Center for Education Research & Policy conducted a study of Massachusetts' school and district priorities for student learning.

Over the last two decades, the pace of technological change has been rapid. We now live in a world where technology permeates American households and has become a central feature of daily life. Americans shop, bank, plan vacations, look for jobs, and build both social and professional networks online. Email, instant messaging and text messaging are vital forms of communication both at home and in the workplace. Books, magazines and newspapers are being replaced by the Internet and handheld devices as the main vehicles of information delivery. Our ability to communicate and collaborate with others is instantaneous and without borders. We have mobile access to information and resources 24 hours a day, 7 days a week and are able to create and share multimedia content with family, friends and colleagues around the world.

The demographic makeup of the United States is also rapidly changing. Racial and ethnic diversity has grown in the U.S., and the nation's population is projected to become even more diverse in the decades to come. The racial/ethnic groups we refer to as minorities, now roughly one-third of the U.S. population, are expected to be the majority in 2042.[1]

New technologies combined with demographic shifts, as well as changes in the political and economic climate have substantially altered the way Americans live and work. In an effort to gain insight into the ways in which Massachusetts' schools are responding to these changes, the Rennie Center conducted a statewide survey of school and district leaders to better understand the skills and knowledge administrators believe are most important for their students to acquire. The survey was followed by an examination of district, school and teacher practices in a small sample of schools and districts. This report describes the background and context for the study, presents the study's key findings and, based on those findings, provides considerations for state policymakers and school and district leaders.

Background and Context

The Massachusetts Education Reform Act of 1993 (MERA) called for dramatic changes in public education including greater and more equitable funding to schools, accountability for student learning, and statewide standards. During this period of reform, curriculum frameworks were developed to outline what students need to know and be able to do in every subject. In order to track students' proficiency against statewide standards and identify gaps in students' knowledge and skills, the Massachusetts Comprehensive Assessment System (MCAS) was developed and established as a graduation requirement for all public school students in the state.

Since the inception of MCAS in 1998, student performance on the English language arts (ELA) and mathematics tests has markedly improved at most grade levels. For example, at grade 10, the percentage of students scoring at the proficient level or higher has increased from 38% in 1998 to 79% in 2009 in ELA, and from 24% in 1998 to 75% in 2009 in mathematics.[2]

Today, Massachusetts is heralded as having one of the top performing public school systems in the nation. On the 2009 National Assessment of Educational Progress (NAEP), Massachusetts' 4th and 8th grade students ranked first in the nation in mathematics for the third time in a row, and on the 2007 Trends in International Mathematics and Science Study

1 U.S. Census Bureau. (2008). "An Older and More Diverse Nation by Midcentury." Retrieved from: http://www.census.gov/newsroom/releases/archives/population/cb08-123.html.

2 Massachusetts Department of Elementary and Secondary Education. (2009). *Spring 2009 MCAS Tests: Summary of State Results.* Retrieved from: www.doe.mass.edu/mcas/2009/results/summary.doc.

(TIMSS) the state's 4th and 8th graders outscored the nation, and many of their international peers, in mathematics and science.[3]

While substantial progress has been made in Massachusetts' schools since the passage of MERA, there is still much to be done. The state struggles to close a persistent achievement gap, and last year, nearly 8,600 high school students dropped out of the Commonwealth's public schools.[4] In addition, recent research suggests that many of those who do graduate from high school are unprepared for postsecondary education and the workforce.

Students' ability to succeed in postsecondary education is a growing concern given recent projections that by 2018, 68% of all jobs in Massachusetts will require training beyond high school.[5] One study of college-readiness found that among Massachusetts' public school graduates who went to college, 37% enrolled in at least one remedial course in their first semester in college. Among the roughly 8,500 students in the study who attended community colleges, 65% took a remedial course.[6] In a national study of instructors who teach first-year students at two- and four-year colleges, a majority indicated they are dissatisfied with the job public schools are doing in preparing students for college when it comes to students' ability to read and comprehend complex material (70%), ability to think analytically (66%), work and study habits (65%), writing quality (62%), ability to do research (59%) and ability to apply what they learn to solve problems (55%).[7]

The business community has also expressed concern about high school graduates' readiness for the workforce. In a study involving focus groups with representatives from 23 Massachusetts businesses, employers who hire recent high school graduates indicated that they are dissatisfied with graduates' basic written and verbal communication skills, mathematics and computer skills, problem-solving skills, and overall demeanor and work ethic.[8] These results are consistent with larger national studies that suggest high school graduates who enter the workforce lack skills that are essential for job success. In one nationwide survey of over 400 employers, employers indicated that recent high school graduates were deficient in their written communication skills, leadership skills, level of professionalism, work ethic and critical thinking/problem solving skills.[9]

Due in part to the challenges described above, many educators, employers, policymakers and parents have begun to call for a new phase of education reform that focuses on ensuring that all of the Commonwealth's students graduate from high school with the knowledge and skills that make them college- and career–ready. In June 2008, the Patrick Administration outlined an education reform strategy intended to transform the Commonwealth's public schools over the next decade. One of the four goals outlined in the Patrick Administration Education Action Agenda is to "prepare every student for postsecondary education, career and lifelong economic, social and civic success."[10] According to the Action Agenda, "Ours is not a 21st century education system. Its structure and underlying assumptions are holdovers from another century, when the goal of public education was to prepare only a fraction of students for higher education. High school graduation rates were low, and that was okay because low-skilled manufacturing jobs could support a family. Times have changed and so must the fundamental promise of public education. Today our schools must ensure that high

3 National Assessment of Education Progress (2009). *NAEP Mathematics 2009 State Snapshot Reports.* Retrieved from http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2010454; Mullis, I.V.S., Martin, M.O., & Foy, P. (with Olson, J.F., Preuschoff, C., Erberber, E., Arora, A., & Galia, J.). *TIMSS 2007 International Mathematics Report: Findings from IEA's Trends in International Mathematics and Science Study at the Fourth and Eighth Grades*. (2008). Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College. Retrieved from: http://timss.bc.edu/TIMSS2007/mathreport.html.

4 Massachusetts Department of Elementary and Secondary Education (2010). *Dropout Rates in Massachusetts Public Schools: 2008-09.*

5 The Georgetown University Center on Education and the Workforce (2010). *Projections of Jobs and Education Requirements Through 2018*.

6 Massachusetts Board of Higher Education & Massachusetts Department of Education. (2008). *Massachusetts School-to-College Report: High School Class of 2005.* Retrieved from: http://www.doe.mass.edu/S/reports/0208bhe.pdf.

7 Achieve, Inc. (2005). *Rising to the challenge: Are high school graduates prepared for college and work?*

8 Massachusetts Business Alliance for Education. (2006). *Preparing for the future: Employer persepectives on work readiness skills.*

9 Casner-Lotto, J. & Barrington, L. (2006). *Are They Really Ready to Work? Employers' Perspectives on the Basic Knowledge and Applied Skills of New Entrants to the 21st century U.S. Workforce.* Retrieved from: http://www.p21.org/documents/FINAL_REPORT_PDF09-29-06.pdf.

10 Commonwealth of Massachusetts Executive Office of Education. (2008). *Ready for 21st Century Success: The New Promise of Public Education, The Patrick Administration Education Action Agenda.* Retrieved from: http://www.mass.gov/Eeoe/docs/ma-edplan-finalrev1.pdf.

school graduates know and are capable of much more than ever before."

In an effort to more directly tie standards to college and career readiness, Massachusetts adopted the Common Core State Standards in July of 2010. The Common Core is a set of national standards in ELA and mathematics designed to be robust and relevant to the real world, reflecting the knowledge and skills that students need for success in college and careers.[11] Massachusetts' Board of Elementary and Secondary Education cited the Common Core's increased academic rigor and stronger expectations for student performance when it unanimously voted to adopt the standards.[12]

Work is underway to create an assessment that is aligned with the Common Core. Massachusetts is a member of the Partnership for the Assessment of Readiness for College and Careers, which was awarded "Race to the Top" assessment funds in September 2010 from the U.S. Department of Education for the development of a K-12 assessment system aligned to the Common Core State Standards in ELA and mathematics. The assessment will be designed to measure both students' knowledge of content and their ability to apply that content. The assessment will include performance tasks and "innovative, computer-enhanced items that elicit complex demonstrations of learning and measure the full range of knowledge and skills necessary to succeed in college and 21st century careers."[13] The goal is for the assessment to be ready for implementation by the 2014-15 school year.

In the 17 years since MERA was signed into law, rapid advances in technology have transformed nearly every aspect of daily life, including how we work, play, communicate and learn. We now live in an increasingly diverse, globalized, media- and technology-saturated society. Across the nation and especially in Massachusetts, we now have employers that demand a better educated and more highly skilled workforce. These trends, combined with the Commonwealth's persistent achievement gaps and graduates who are ill-prepared for postsecondary education and the workplace, have convinced some educators and policymakers that the current education standards are not sufficient. These education reformers are in favor of expanding the definition of what students need to know and be able to do. The intent is not to replace the traditional academic disciplines but to infuse them with knowledge and skills that will better prepare students for success in the 21st century—often referred to as "21st century skills." Knowledge and skills related to technology, information, media and global awareness as well as critical thinking, problem solving, adaptability, communication and collaboration skills are among those often considered 21st century skills.

Over the last few years, the Commonwealth has taken steps toward developing a statewide strategy for integrating 21st century skills into public education. In June 2007, Massachusetts joined the Partnership for 21st Century Skills (P21), a national organization that promotes the integration of 21st century skills in K-12 education by building collaborative partnerships among education, business, community and government leaders. The following spring, the Massachusetts Board of Elementary and Secondary Education formed a Task Force on 21st Century Skills to assist the Board in considering how to infuse 21st century skills into the work of the state's public schools. Specifically, the Task Force was asked to develop a set of recommendations for the Board to address alignment in policies regarding standards, curriculum, assessments and accountability in a way that promotes deeper integration of 21st century skills. In November 2008, the 20-member Task Force issued its recommendations in a report entitled *School Reform in the New Millennium: Preparing All Children for 21st Century Success*. Most recently, the Board asked the Commissioner of the Department of Elementary and Secondary Education to work with his staff to develop a plan for implementing the Task Force's recommendations.

The movement toward integrating 21st century skills into teaching and learning has not advanced without criticism. Some opponents argue that while skills like creativity, collaboration and problem solving may be important to employers, the state's urban districts, whose students have not yet mastered reading, writing and mathematics skills, should remain focused on the basics and that only suburban districts that have demonstrated mastery of the "three Rs" (reading, writ-

11 For more information, see http://www.corestandards.org/.

12 Massachusetts Department of Elementary and Secondary Education. (2010). "Education Board adopts Common Core standards to keep Massachusetts students national leaders in education." Retrieved from: http://www.doe.mass.edu/news/news.aspx?id=5634.

13 Partnership for Assessment of Readiness for College and Careers. (2010). *Race to the Top Comprehensive Assessment Systems Competition Application.* Retrieved from: http://www.fldoe.org/parcc/pdf/apprtcasc.pdf.

What are "21st century skills"?

The phrase "21st century skills" is frequently used in education policy discussions. Generally speaking, the term refers to skills that many argue are necessary for success in the 21st century. Some observers point out that these skills have been around for centuries and what has changed is the extent to which success in today's world depends on having these skills.[14] A number of organizations have developed frameworks that identify the individual skills students need to succeed. For example, the North Central Regional Education Laboratory's *enGauge* framework includes digital-age literacy, inventive thinking, effective communication and high productivity as the most important skill sets.[15] The Partnership for 21st Century Skills has developed a framework that includes what they refer to as 21st century themes (global awareness, civic literacy, health literacy, and financial, economic, business, and entrepreneurial literacy); learning and innovation skills; life and career skills; and information, media and technology skills. (For definitions of the skills included in the Partnership for 21st Century Skills framework, refer to page 10.)

ing and arithmetic) should implement 21st century skills as an *"add on."*[16] These opponents argue that students must acquire basic content knowledge before they are able to acquire 21st century skills. They advocate for staying the course as outlined in 1993 by focusing on a solid foundation of content and urge policymakers to consider changes only after schools and districts have achieved the goals that are currently in place. They caution that adding additional knowledge and skills to the curriculum frameworks will result in low-performing districts falling further behind. Many opponents also object to 21st century skills because they view them as "soft skills" that cannot be assessed and therefore believe that a focus on these skills will undercut the more important focus on high academic standards.

In order to inform the debate about the rationale for and relevance of 21st century skills in Massachusetts' public schools, the Rennie Center for Education Research & Policy embarked upon its study of Massachusetts' school and district priorities for student learning. The statewide integration of 21st century skills into public education hinges on the support of school and district leaders. In order to better understand the skills and knowledge administrators believe are most important for their students to acquire, the Rennie Center conducted a statewide survey of school and district leaders. The Rennie Center also collected information about district, school and teacher approaches for infusing 21st century skills into learning environments from a small sample of administrators and educators in districts and schools where the integration of 21st century skills is a priority.

The study gives voice to key education stakeholders who have not been part of the public debate about 21st century skills and provides clarity about what teaching and learning in classrooms that incorporate 21st century skills looks like. While opponents of 21st century skills argue that districts where most students have not yet mastered reading, writing and mathematics skills should focus exclusively on core academic content, the study revealed that most school and district leaders believe all public schools in Massachusetts should be required to integrate 21st century skills into learning, including schools where students are lacking adequate basic skills. Interviews with superintendents who prioritize integration of 21st century skills revealed that input from a range of stakeholders led their district to expand their mission and vision for student learning to include 21st century skills and rather than adopt a pre-packaged set of skills, the focus in these districts is on particular skills and competencies that fit the needs of their student body. While most schools and districts have not developed measurable goals for student mastery of 21st century skills, interviews with a small sample of administrators and educators revealed that 21st century skills are assessed at the classroom level, and most administrators view school- and district-wide assessment as a future step in the process of fully integrating 21st century skills. The findings also suggest that administrators believe that, to date, state policymakers have not adequately supported the teaching and learning of 21st century skills.

14 Rotherham, A. J. & Willingham D. T. (2010). "21st Century" Skills: Not New, but a Worthy Challenge. *American Educator,* Spring 2010, 17-20. Retrieved from: http://www.aft.org/pdfs/americaneducator/spring2010/RotherhamWillingham.pdf.

15 NCREL/Metiri Group. (2003). *enGuage 21st Century Skills for 21st Century Learners.* Retrieved from: http://www.metiri.com/21/Metiri-NCREL21stSkills.pdf.

16 Pioneer Institute for Public Policy. (2009). *A Step Backwards: An Analysis of the 21st Century Skills Task Force Report.*

Purpose and Methods

In order to inform the debate about the rationale for and relevance of 21st century skills in Massachusetts' public schools, the Rennie Center for Education Research & Policy conducted a study of Massachusetts' school and district priorities for student learning. The study was conducted in two phases. First, a statewide survey of superintendents, principals and charter school leaders was conducted to better understand Massachusetts' public school and district leaders' priorities for improving student learning, including their views on 21st century skills. The survey was followed by interviews with a small sample of administrators and educators in districts and schools where the integration of 21st century skills is a priority, in order to better understand district, school and teacher approaches for infusing 21st century skills into teaching and learning. Each phase of the study is described below.

Phase 1: Statewide Survey of School and District Leaders

The Rennie Center conducted a survey of superintendents, charter school leaders and principals statewide to gauge the extent to which school and district leaders support the integration of 21st century skills into public education. The goal of this phase of the study was to provide a better understanding of Massachusetts' public school and district leaders' priorities for improving student learning, including their views on 21st century skills.

Data collection

A total of 301 superintendents and charter school leaders, and 1781 principals across the state were invited to participate in an online survey entitled *Goals for Improving Student Learning*. All school and district leaders for whom email addresses could be secured were invited to participate.

Data collection occurred over a two month period beginning in late January 2010 and concluding in late March. School and district leaders were emailed a letter notifying them of the study. An invitation that contained a link to the online survey was emailed one week later. Up to four reminder emails were sent to non-responders during the data collection period. To increase the response rate, all district leaders and a random sample of principals received a reminder phone call.

The overarching goal of the survey was to provide a snapshot of the knowledge and skills that school and district leaders statewide believe are most important for their students to acquire and the extent to which 21st century skills are a priority. Given the debate surrounding 21st century skills and ambiguity about what the term means, there was concern that using the term "21st century skills" in our outreach for the study might result in some school and district leaders not responding to the survey and thus biasing the survey results. To avoid such nonresponse bias,[17] the survey was entitled *Goals for Improving Student Learning* and both the notification letter and invitation email explained that the study was being conducted to better understand Massachusetts' schools' and districts' priorities for improving student learning and that results of the study would be used to provide state policymakers with a complete picture of the skills and knowledge administrators believe are most important for their students to acquire.

Questionnaire

The online survey covered four main areas.

- **Skills.** Principals were asked to think about all of the core subject matter classes (defined as English/reading/language arts, economics, geography, history, mathematics, science, world languages, arts, government and civics) that are taught in their school and indicate which, if any, are designed to improve students' mastery of particular 21st century skills, in addition to promoting understanding of academic content. They were also asked to indicate whether particular 21st century skills are included in the school's mission/vision and strategic planning documents, and whether the school has developed measurable goals for student mastery of those skills. Superintendents and charter school leaders were asked to rate the importance of incorporating particular 21st century skills into teaching and learning. Given that Massachusetts is a member of the Partnership for 21st Century Skills (P21), the definitions

17 "Nonresponse bias" is bias that results when respondents differ in meaningful ways from nonrespondents.

of 21st century skills and core subject matter classes used in the survey were based on P21's *Framework for 21st Century Learning*. The skills included in the survey questions and their definitions are shown on page 10.

- **Priorities.** Both principals and district leaders were presented with a series of topics and asked to rate whether or not the topics are a priority for their school or district, using a five-point scale. A number of topics were presented, including: increasing performance on MCAS, meeting AYP subgroup targets, decreasing crime/violence and addressing problems that impact students' readiness to learn. Five of the eighteen topics were about 21st century skills.
- **State policymaking.** Both principals and district leaders were asked to indicate the extent to which they agree or disagree that the state should engage in particular initiatives. The respondents were asked to rate some initiatives recommended by the state's Task Force on 21st Century Skills.[18] However, respondents were not told that these initiatives were recommendations from the Task Force. The findings from this section of the survey were reported in a Rennie Center issue brief that was released in August, 2010.[19]
- **State support.** Both principals and district leaders were asked to indicate the extent to which they agree or disagree that the state currently supports the teaching and learning of 21st century skills in various ways.

Study participants

A total of 155 superintendents and charter school leaders (52% of those invited) and 375 principals (21% of those invited) participated in the survey. Due to the 21% response rate among principals and the disproportionate percentage of participating middle and high school principals (as explained below), the findings may not represent the views of principals statewide.

The urbanicity of participating schools and districts are representative of the state as a whole. As shown in Table 1, the distribution of participating schools and districts according to their location (urban, suburban, rural) is aligned with that of the state. As shown in Table 2, the participating schools included a smaller percentage of elementary schools than there are statewide (53% of schools in the study compared with 63% statewide) and both middle and high schools are slightly over represented in the study.

TABLE 1: LOCATION OF PARTICIPATING SCHOOLS AND DISTRICTS

	SCHOOLS		DISTRICTS	
Location	Study	State	Study	State
Urban	37%	38%	21%	23%
Suburban	48%	49%	58%	52%
Rural	15%	13%	21%	25%

TABLE 2: GRADE LEVEL OF PARTICIPATING SCHOOLS

	SCHOOLS	
Grade level[20]	Study	State
Elementary	53%	63%
Middle	21%	17%
High	26%	20%

18 Rennie Center for Education Policy & Research. (2010). *21st Century Skills State Policy Initiatives: School Leaders' Views*. Retrieved from: http://renniecenter.issuelab.org/research/listing/21st_century_skills_state_policy_initiatives_school_leadersa_views.

19 *Ibid.*

20 For this comparison, the classifications used by the Massachusetts Department of Elementary and Secondary Education were retrieved from: http://profiles.doe.mass.edu/help/data.aspx#cha.

Phase 2: Interviews with District Leaders, Principals and Educators

The goal of this phase of the study was to provide a better understanding of the approaches superintendents, charter school leaders, principals and teachers are using to incorporate 21st century skills into teaching and learning. Responses to the online survey were used to identify school and district leaders whose schools and districts would be the focus of Phase 2 of the study. The selection criteria are described below.

Criteria for selecting schools

An initial sample of schools was selected based on the following criteria:

- Principal indicated that particular 21st century skills are included in the school mission/vision statement. (The skills from which the principals chose and their definitions are shown on page 10.)
- Principal indicated that many core subject matter classes are designed to improve students' mastery of particular 21st century skills.
- Principal indicated that 21st century skills integration is a high priority for the school.

When selecting schools from the initial pool of candidates, the following characteristics were taken into consideration to ensure a broad range of schools was included in the study:

- Grade levels
- Location
- Percent of minority students
- Percent of low-income students

Performance on MCAS, as measured by the Composite Performance Index (CPI),[21] was also taken into consideration to ensure the selected schools had relatively high levels of academic achievement. In cases where both the school principal and district superintendent participated in the study, the extent to which the superintendent rated 21st century skills as a priority for the district was also taken into consideration.

Criteria for selecting educators

Principals of participating schools were asked to select two or three classroom teachers from a variety of subjects and grade levels, who they believe do an outstanding job of incorporating 21st century skills into core subject matter classes. A few principals selected other educators and, as a result, one library teacher, one technology coordinator, one counselor and one school nurse were also interviewed by the research team.

Criteria for selecting district leaders

District leaders who indicated that 21st century skills are important and a high priority for their district were selected as candidates for this phase of the study. When selecting district leaders from this initial pool, whether a school in the district was included in the study was taken into consideration. The goal was to ensure that the sample included some educators, principals and superintendents from the same district so that the relationship between district- and school-wide approaches to integrating 21st century schools could be examined.

Data collection

Data collection occurred over a two month period beginning in late April 2010 and concluding in late June. School and district leaders were emailed an invitation to participate in the second phase of the study in April. The letter explained that the study was being conducted to learn more about what school and district leaders are doing to support the teach-

21 The Composite Performance Index (CPI) is a 100-point index that combines the scores of students who take standard MCAS tests with the scores of those who take the MCAS-Alternate and is a measure of the extent to which students are progressing toward proficiency in ELA and mathematics.

ing and learning of 21st century skills in the school or district. Superintendents and charter school leaders were invited to participate in a 40-minute telephone or in-person interview. Principals were asked if a member of the research team could visit the school. School visits included a 40-minute interview with the principal and 30 to 40-minute, one-on-one interviews with two to three teachers selected by the principal.

Interview protocol

The purpose of the interviews with school and district leaders was to shed light on *why* 21st century skills are considered a priority, *how* these skills came to be part of the school/district mission and vision for student learning, and to provide insight into how school/district leaders have created a culture that encourages and enables the integration of 21st century skills into teaching and learning. The school and district leader interviews focused on two main areas:

- **Mission and vision.** Each interview began with a series of questions about the school/district mission and vision for student learning. School and district leaders were asked to indicate which 21st century skills (from the list shown on page 10) are part of the school's/district's mission and vision and to describe the strategic planning process. They were asked about the extent to which principals, educators and parents have embraced the vision for student mastery of these 21st century skills and what, if any, strategies were used to gain their support. The interview also included questions about how the school/district is monitoring and tracking their success at accomplishing the mission/vision for students' mastery of 21st century skills.
- **Policies and practices.** This series of questions focused on the specific policies and practices that have been put into place in order to achieve the mission/vision for student mastery of 21st century skills as well as which strategies have been most successful in creating a culture that encourages and enables the integration of 21st century skills across all grades levels and subjects. The interview also included questions about learning environments (physical environments, scheduling, technology infrastructure and tools, other materials, and resource allocation), professional development, external partnerships (with parents, businesses, community organizations, higher education, and vendors), assessment and accountability.

The purpose of the interviews with educators was to shed light on *how* teachers incorporate 21st century skills into their classrooms, and to identify common strategies for increasing student mastery of both 21st century skills and core content. The educator interviews focused on three main areas:

- **Instructional approaches and strategies.** Each interview began by asking educators to describe their process for developing lessons designed to enhance deep mastery of both core subject knowledge and 21st century skills. Educators were also asked to describe the instructional strategies that they find most effective for developing students' mastery of both core subject knowledge and 21st century skills.
- **Specific examples.** This series of questions focused on specific examples of the teaching and learning of 21st century skills. Educators were asked to describe particular lessons or assignments that they consider to be the most effective at increasing both students' knowledge and understanding of 21st century skills and core subject matter.
- **School-wide policies and practices.** This series of questions focused on school-wide policies and practices. Educators were asked to describe how the school leadership has created a culture that encourages and enables the integration of 21st century skills across all grades levels and subjects. They were also asked what policies and practices have been most successful and what incentives, if any, are in place to encourage educators in the school to integrate 21st century skills into teaching and learning.

Study participants

Interviews were conducted with 9 superintendents, 1 charter school leader, 12 principals and 47 educators in 12 schools (see Appendix A for a list of all study participants). Characteristics of participating schools and districts are shown in Tables 3 and 4.

TABLE 3. CHARACTERISTICS OF PARTICIPATING DISTRICTS

Districts	Location	% Minority[22]	% Low Income[23]	CPI (Spring 2009 MCAS)
Arlington	Suburban	22%	11%	ELA: 94.7 Math: 89.8
Brockton	Urban	72%	72%	ELA: 77.7 Math: 67.1
Pentucket Regional	Suburban	4%	10%	ELA: 92.9 Math: 86.8
Reading	Suburban	8%	5%	ELA: 93.4 Math: 90.1
Shrewsbury	Suburban	19%	11%	ELA: 94.8 Math: 90.5
Somerville	Urban	60%	68%	ELA: 77.3 Math: 68.6
Springfield	Urban	86%	81%	ELA: 70.9 Math: 57.3
Watertown	Suburban	26%	27%	ELA: 88.1 Math: 79.9
Whitman-Hanson Regional	Suburban	6%	17%	ELA: 88.9 Math: 80.0

TABLE 4. CHARACTERISTICS OF PARTICIPATING SCHOOLS

School Name (District)	Grade Level	Location	% Minority	% Low Income	CPI (Spring 2009 MCAS)
Shutesbury Elementary (Shutesbury)	PK-6	Rural	16%	10%	ELA: 94.4 Math: 87.2
Birch Meadow Elementary (Reading)	K-5	Suburban	11%	4%	ELA: 83.7 Math: 79.0
East Somerville Community (Somerville)	K-8	Urban	81%	86%	ELA: 77.0 Math: 68.3
Hill View Montessori Charter Public	K-8	Suburban	24%	26%	ELA: 83.0 Math: 76.5
Lilla G. Frederick Pilot Middle (Boston)	6-8	Urban	97%	89%	ELA: 70.5 Math: 49.5
J.F. Kennedy Middle (Natick)	5-8	Suburban	17%	7%	ELA: 94.9 Math: 87.7
Oak Middle (Shrewsbury)	7-8	Suburban	17%	12%	ELA: 96.6 Math: 88.0
The Springfield Renaissance (Springfield)	6-12	Urban	73%	58%	ELA: 83.5 Math: 59.3
Arlington High (Arlington)	9-12	Suburban	20%	11%	ELA: 98.5 Math: 96.0
Brockton High (Brockton)	9-12	Urban	73%	69%	ELA: 91.4 Math: 80.9
Chatham High (Chatham)	9-12	Rural	10%	12%	ELA: 98.5 Math: 97.5
Watertown High (Watertown)	9-12	Suburban	23%	30%	ELA: 94.8 Math: 91.7

22 In Tables 3 and 4, % Minority is the percentage of students enrolled in the school/district who are not white.

23 In Tables 3 and 4, % Low Income is the percentage of students enrolled in the school/district who receive free or reduced price lunch.

Definitions used for the study[24]

Global awareness. Understanding and addressing global issues; learning from and working collaboratively with individuals representing diverse cultures, religions and lifestyles in a spirit of mutual respect and open dialogue; 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 productivity and career options.

Health literacy. Obtaining, interpreting and understanding basic health information and using such information in ways that enhance health; understanding preventive physical and mental health measures, including proper diet, nutrition, exercise, risk avoidance and stress reduction; understanding national and international public health and safety issues.

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.

Information literacy. Accessing information efficiently (time) and effectively (sources); evaluating information critically and competently; using information accurately and creatively for the issue or problem at hand; managing the flow of information from a wide variety of sources; applying a fundamental understanding of the ethical/legal issues surrounding the access and use of information.

Media literacy. Understanding both how and why media messages are constructed, and for what purposes; examining how individuals interpret messages differently, how values and points of view are included or excluded, and how media can influence beliefs and behaviors; applying a fundamental understanding of the ethical/legal issues surrounding the access and use of media; understanding and utilizing the most appropriate media creation tools, characteristics and conventions.

Technology literacy. Using technology as a tool to research, organize, evaluate and communicate information; using digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successfully function in a knowledge economy; applying a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies.

Life and career skills including: flexibility, adaptability, initiative, self-direction, social and cross-cultural skills, productivity, accountability, leadership and responsibility.

Learning and innovation skills including: creativity, innovation, critical thinking, problem solving, communication and collaboration.

24 Given that Massachusetts is a member of P21, the definitions used in the survey are based on *P21's Framework for 21st Century Learning*.

Survey Findings

The overarching goal of the survey was to provide a snapshot of the knowledge and skills that school and district leaders statewide believe are most important for their students to acquire and the extent to which 21st century skills are a priority. The findings presented in this section are based on survey responses from 155 superintendents and charter school leaders (52% of those invited) and 375 principals (21% of those invited) from public schools and districts across Massachusetts. When describing the survey findings, the word "superintendents" will be used to refer generally to district leaders, both superintendents and charter school leaders. Due to the 21% response rate among principals and the disproportionate percentage of participating middle and high school principals (as explained in the Purpose and Methods section), it is important to note that the findings may not represent the views of principals statewide.

Superintendents statewide believe it is important for educators in their districts to teach lessons and give students in-class and homework assignments that are designed to enhance students' mastery of 21st century skills as well as core academic content. Superintendents rated the importance of 21st century skills and core content areas[25] on a scale of 1 to 5 where a 1 means "not at all important" and a 5 means "extremely important." As shown in Figure 1, the mean ratings are all above 4.00, which indicates that overall, superintendents view all of the 21st century skills and core content areas as important.

The average ratings range from a high of 4.99 to a low of 4.24 with particular core content areas and 21st century skills throughout the range. For example, as shown in Figure 1, mathematics, ELA, science and several 21st century skills including critical thinking, communication, responsibility and technology literacy, received some of the highest mean ratings. Among the lowest mean ratings are economics, world languages, arts as well as some 21st century skills including media literacy, financial/economic/business/entrepreneurial literacy, leadership and cross-cultural skills.

It is also important to note that the mean ratings of urban, suburban and rural superintendents were compared and no significant differences were found.

Incorporating 21st century skills into teaching and learning is a priority for most districts. Superintendents rated the extent to which each of the issues shown in Table 5 is a priority for their districts using a 1 to 5 scale where a 1 means "not a priority" and a 5 means "high priority." The issues related to 21st century skills are highlighted in the table. The percentage of superintendents rating the issues related to 21st century skills as a priority (rating of a 4 or 5) is equal to or greater than many of the other issues that are often priorities for public school districts, including hiring and retaining teachers in high need content areas, increasing the number of students who pursue postsecondary education, increasing graduation rates and decreasing dropout rates.

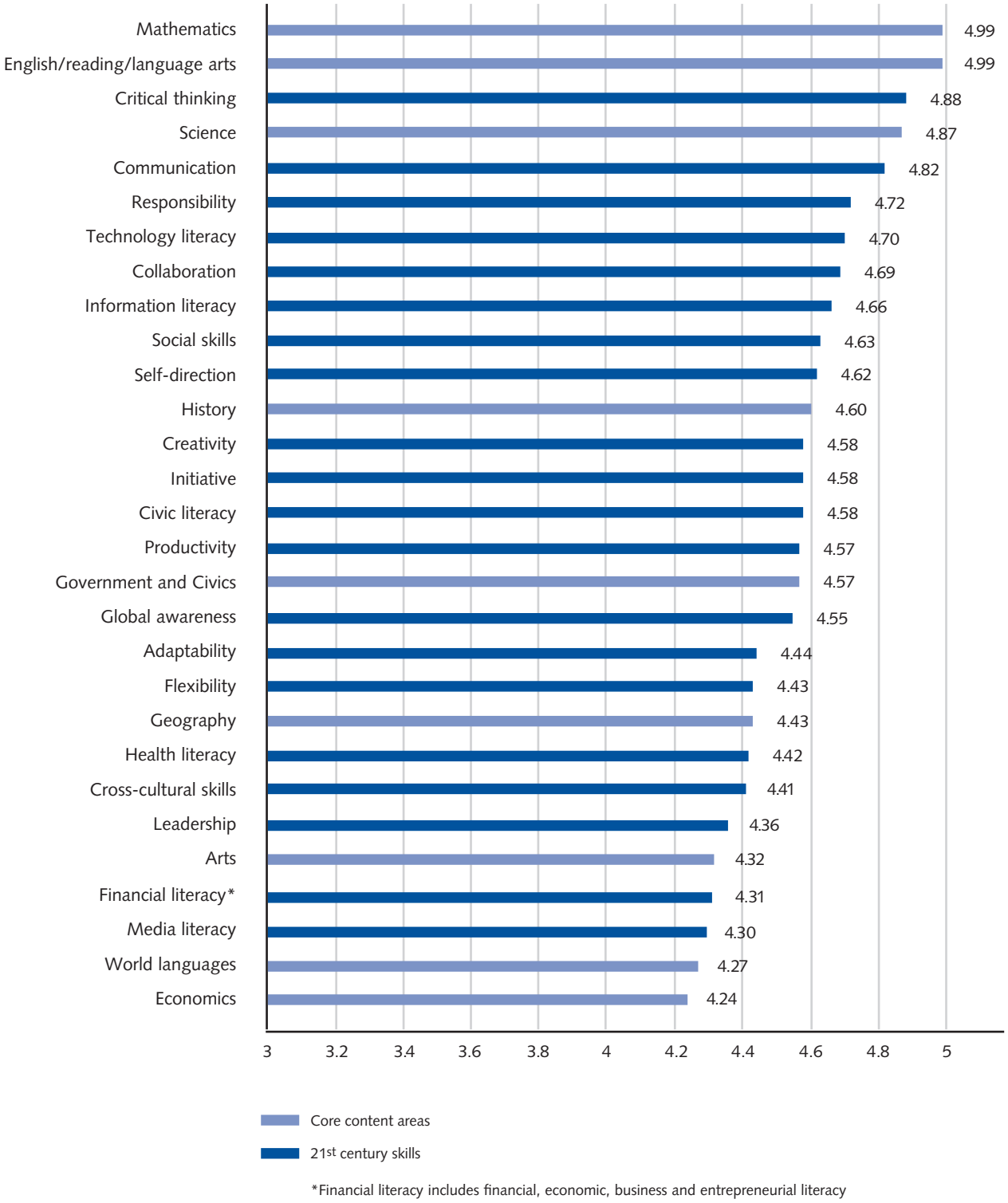
Eighty-five percent of superintendents indicated that it is a priority (rating of 4 or 5) for educators to develop and teach lessons that are designed to enhance deep mastery of core subject knowledge and 21st century skills (row F in Table 5). Providing professional development to teachers to do so is also a priority for most (86%) superintendents (row D in Table 5). Having all core content curricula explicitly integrate 21st century skills and providing appropriate technology infrastructure and tools that support student acquisition of 21st century skills are priorities for over 80% of superintendents (rows J and C in Table 5).

The mean ratings of urban, suburban and rural superintendents were compared and only one significant difference was found. Urban superintendents' mean rating of 4.42 on the statement "increasing parental and community involvement" was significantly higher than the mean rating of suburban superintendents, 3.91 ($p<.05$). The mean rating of rural superintendents (4.07) was not significantly different from that of urban and suburban superintendents.

25 Core content areas include: English/reading/language arts, economics, geography, history, mathematics, science, world languages, arts, government and civics.

FIGURE 1. SUPERINTENDENT MEAN IMPORTANCE RATINGS

Please indicate the extent to which you think it is important for educators in your district to teach lessons and give students in-class and homework assignments that are designed to improve the following skills:



*Financial literacy includes financial, economic, business and entrepreneurial literacy

TABLE 5. DISTRICT PRIORITIES

Please indicate the extent to which each of the following is a priority for your district:		% of superintendents who gave a rating of 4 or 5*
A.	Increasing the number of students who score at the proficient level or above on MCAS	91%
B.	Meeting AYP subgroup targets (e.g., students with disabilities, students with limited English proficiency, economically disadvantaged students, etc.)	90%
C.	Providing appropriate technology infrastructure and tools that support student acquisition of 21st century skills	86%
D.	Providing professional development that focuses on improving educator capacity to teach core academic content in ways that enhance 21st century skills mastery	86%
E.	Increasing the number of students who pursue postsecondary education	86%
F.	All educators develop and teach lessons that are designed to enhance deep mastery of core subject knowledge and 21st century skills	85%
G.	Hiring and retaining teachers in high need content areas	85%
H.	A variety of classroom-based assessment strategies are used for all students, including portfolios, capstone projects, performance-based assessments and curricula-embedded assessments, among others	83%
I.	All educators construct lessons that enable a student's progression from teacher-led to self-directed learning	81%
J.	All core academic content curricula explicitly integrates 21st century skills	81%
K.	Decreasing crime and violence including bullying, verbal abuse and sexual harassment	80%
L.	Increasing the number of students enrolled in AP classes	78%
M.	Increasing the graduation rate**	76%
N.	Decreasing the dropout rate**	76%
O.	A majority of student work is evaluated at the classroom level for mastery of 21st century skills	74%
P.	Increasing parental and community involvement	74%
Q.	Increasing the attendance rate	69%
R.	Addressing problems (e.g. hunger, homelessness, involvement in gangs, use of drugs/alcohol, etc.) that impact students' readiness to learn	62%

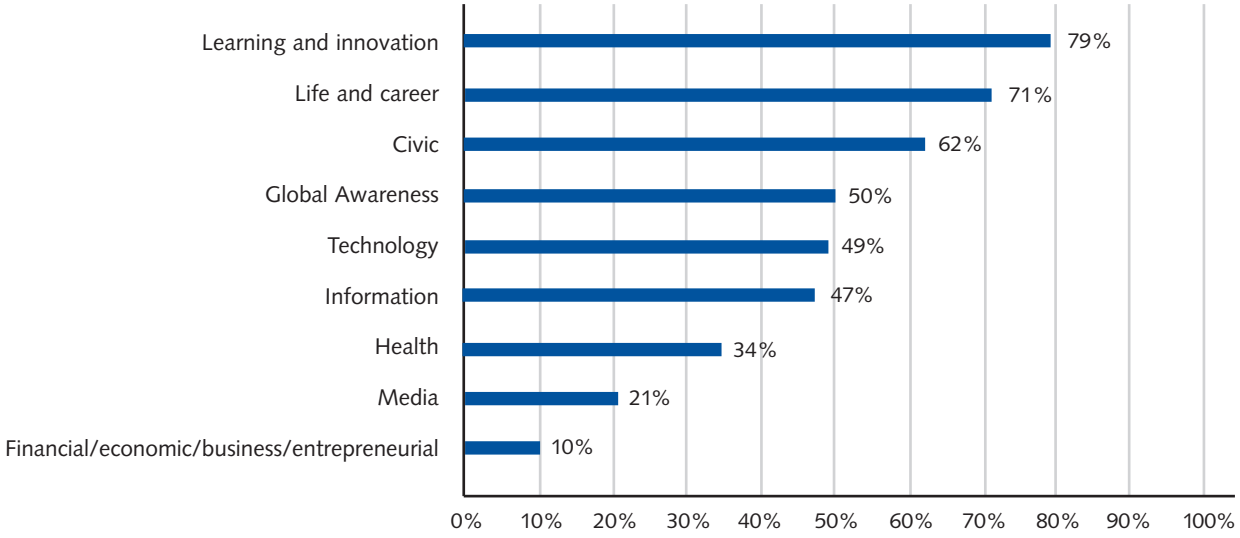
* Superintendents rated each statement on a scale of 1 to 5 where a 1 means "not a priority" and a 5 means "high priority."

** Only included in survey for superintendents and principals whose schools include grade levels 9, 10, 11 or 12.

NOTE: The priorities related to 21st century skills are highlighted in the table.

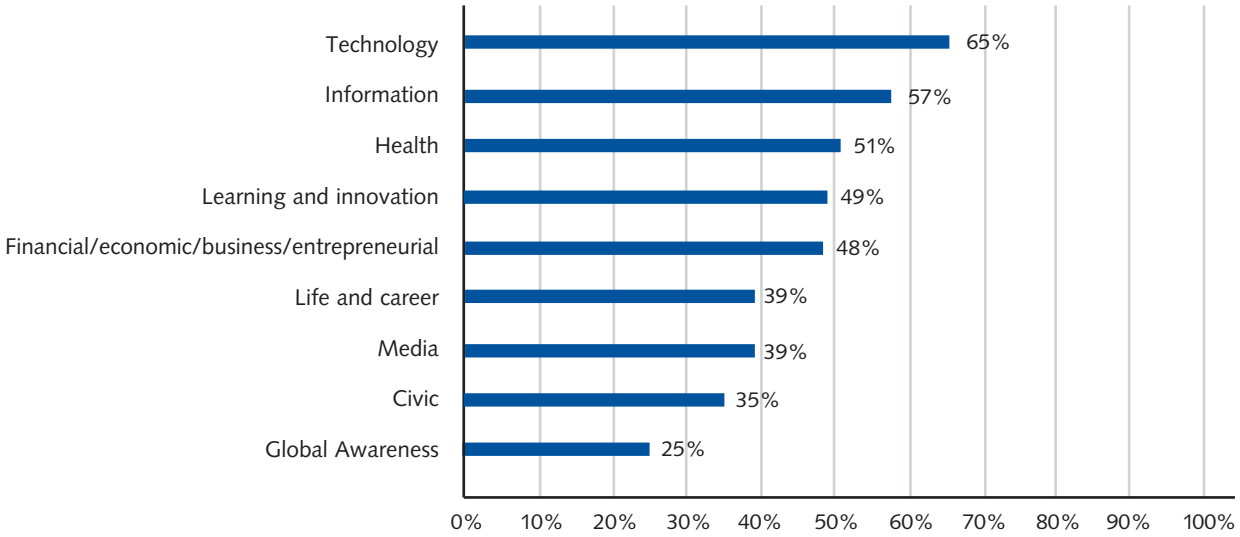
Most school mission/vision statements include 21st century skills. Almost all (98%) of the principals surveyed indicated that their school mission/vision statement includes at least one of the skills that the study defined as 21st century skills. The 21st century skills that are most commonly included in surveyed schools' mission/vision statements are learning and innovation skills (79%), life and career skills (71%) and civic literacy (62%). As shown in Figure 2, about half of school mission/vision statements include global awareness, technology or information literacy.

FIGURE 2. PERCENTAGE OF SCHOOLS THAT INCLUDE PARTICULAR 21ST CENTURY SKILLS IN THE SCHOOL MISSION/VISION STATEMENT



Among the schools that have included particular 21st century skills in their mission/vision for student learning, many have not yet developed goals for measuring students' mastery of these skills. For example, even though learning and innovation skills, life and career skills, and civic literacy are commonly part of schools' vision for student learning (see Figure 2), less than half of the schools who include those skills in their mission have developed measurable goals for student mastery of these skills (see Figure 3). On the other hand, while about half of schools include technology and information literacy as part of their school mission (see Figure 2), a majority of them have developed measurable goals for student mastery of those skills, 65% and 57% respectively (see Figure 3).

FIGURE 3. PERCENTAGE OF SCHOOLS THAT HAVE DEVELOPED MEASURABLE GOALS FOR STUDENT MASTERY OF THE 21ST CENTURY SKILL THAT IS PART OF THE SCHOOL MISSION/VISION STATEMENT



Student mastery of 21st century skills is often taken into consideration when school and district leaders make decisions related to learning environments. There are various factors school and district leaders take into consideration when making decisions about the learning environments in their schools and districts. We asked superintendents and principals to reflect on the decisions they had made about learning environments at the time they took the survey in the 2009-10 school year and indicate the percent of decisions that took student mastery of 21st century skills into consideration. Two-thirds said they had taken student mastery of 21st century skills into consideration in more than half of their decisions.

Teachers document and share examples of educator and student application of 21st century skills. Seventy-five percent of principals indicated that during the previous school year (2008-09), teachers in their school documented and shared examples of educator and student application of 21st century skills. The remainder said teachers did not do so or they were unsure. Among the principals who said documentation and sharing occurs, 43% said it occurs once a month or more and the remainder said it occurred less often than that.

Principals and superintendents honor and publicize 21st century skills best practices in their schools and districts. Sixty-two percent of principals and sixty-seven percent of superintendents indicated that they honored and publicized 21st century skills best practices in their school or district during the 2008-09 school year.

School and district leaders believe that all public schools in Massachusetts should be required to integrate 21st century skills into learning, including schools where students are lacking adequate basic skills. More than three-quarters of surveyed principals and superintendents agree that all public schools in Massachusetts should be required to integrate 21st century skills into learning. Very few, just 10%, believe that it is unrealistic to expect educators in schools where students are lacking adequate basic skills to integrate 21st century skills into learning. Similarly, very few (8%) believe that in schools where achievement gaps are large, it is unrealistic to expect educators to integrate 21st century skills into learning. With regard to technology, nine out of ten school and district leaders agree that all teachers should have technological competence and the ability to help students use technology effectively. (See Table 6.)

TABLE 6. OPINIONS ON 21ST CENTURY SKILLS

Statement	% of school and district leaders who agree/ strongly agree
All teachers should have technological competence and the ability to help students use technology effectively.	90%
All public schools in Massachusetts should be required to integrate 21st century skills into learning.	78%
The term "21st century skills" is a new name for skills educators have been teaching to students for years.	37%
In schools where students are lacking adequate basic skills, it is unrealistic to expect educators to integrate 21st century skills into learning.	10%
In schools where achievement gaps are large, it is unrealistic to expect educators to integrate 21st century skills into learning.	8%

School and district leaders do not think state policymakers[26] are investing in and supporting the integration of 21st century skills into teaching and learning. In fact, only 27% of school and district leaders feel that state policymakers have clearly defined 21st century skills. Only one-quarter believe policymakers have ensured appropriate funding to support and monitor progress on the comprehensive integration of 21st century skills across the educational system and that policymakers have ensured that standards, assessments, professional development and curricula are aligned,

26 In the survey, the term "policymakers" was defined as "state policymakers, including the Governor, Secretary of Education, Commissioner of Education, Board of Elementary and Secondary Education and state legislators."

and include 21st century skills. Less than one-quarter believe state policymakers have consistently set policy that supports student mastery of 21st century skills and invest in assessments that cover student mastery of 21st century skills. (See Table 7.)

TABLE 7. STATE SUPPORT FOR 21ST CENTURY SKILLS

The state currently addresses the following issues:	% of school and district leaders who agree/strongly agree
State policymakers invest in educator professional development that covers student mastery of 21st century skills.	28%
State policymakers have clearly defined 21st century skills.	27%
State policymakers ensure appropriate funding to support and monitor progress on the comprehensive integration of 21st century skills across the educational system.	26%
State policymakers create tangible incentives for educators to lead, teach and assess 21st century skills.	25%
State policymakers ensure that all standards, assessments, professional development and curricula are aligned, and include 21st century skills.	25%
State policymakers consistently set policy that supports student mastery of 21st century skills.	22%
State policymakers invest in assessments that cover student mastery of 21st century skills.	20%

Interview Findings

The goal of this phase of the study is to provide a better understanding of the approaches superintendents, charter school leaders, principals and teachers in Massachusetts public schools are using to incorporate 21st century skills into teaching and learning. This phase of the study examined practices in a small sample of schools and districts whose leaders' responses to the online survey indicated that integration of 21st century skills is a priority. It is important to note that schools were *not* selected based on how well they are incorporating 21st century skills. (The selection criteria are described in detail in the Purpose and Methods section of the report.)

The findings presented in this section of the report are based on interviews with 9 superintendents, 1 charter school leader, 12 principals and 47 educators in 12 schools (see Appendix A for a list of all study participants). Findings from interviews with school and district leaders are presented first, followed by findings from interviews with educators. It is important to note that the practices and examples described below are not intended to serve as exemplars; they are intended to dispel misconceptions and bring greater clarity to what the integration of 21st century skills looks like at the district, school and classroom levels. Case studies of two public school districts, Reading Public Schools and Brockton Public Schools are included in Appendix B. The case studies offer two different approaches to integrating 21st century skills district-wide. The case study of Reading Public Schools illustrates a district-led approach. The case study of Brockton Public Schools is an example of how one school has spurred a district to focus on 21st century skills.

Findings from interviews with school and district leaders

The school and district leaders interviewed for this phase of the study indicated in their online survey responses that integration of 21st century skills is a priority for their schools and districts. The interviews shed light on *why* 21st century skills are considered a priority and *how* these skills came to be part of the school/district mission and vision for student learning. The interviews also provided insight into how these school and district leaders have created a culture that encourages and enables the integration of 21st century skills into teaching and learning. The themes highlighted below describe areas that all or most school and district leaders mentioned as critical to their efforts to integrate 21st century skills at the school and district levels.

Input from a range of stakeholders led districts to expand their mission and vision for student learning to include 21st century skills. Many of the districts engaged in a strategic planning process that drew input from both school and community members to expand their mission and vision for student learning to include some of the knowledge and skills often referred to as "21st century skills." For example, Springfield Public Schools engaged in a strategic planning process that gathered input from over 5,000 stakeholders, including teachers, administrators, students, parents, community members and business leaders. The resulting plan lays out key priorities for student learning to fulfill Springfield's mission to *"provide the highest quality of education so that all of our students are empowered to realize their full-potential and lead fulfilling lives as lifelong learners, responsible citizens and leaders in the 21st Century."*

Watertown Public Schools developed their mission and strategic goals through a series of community forums which included parent-teacher organizations, school site councils, rotary club, business leaders, town council, students and the school committee. According to Superintendent Ann Koufman-Frederick, *"It was an iterative process"* that led to the development of three strategic goals: 1) support high academic achievement through inquiry, problem solving, collaboration, creativity and hard work; 2) foster self-actualization and life-long learning; and 3) promote global and local citizenship.

Developing a vision for 21st century education: Pentucket Regional School District

Pentucket Regional School District is located in West Newbury along the south banks of the Merrimack River. The school district began developing their vision for 21st century education four years ago with a community-wide effort to identify common learning goals for students and establish district priorities. District leaders asked the community to define the qualities of *"highly effective people"* and gathered input from over 300 community members. District teams worked to define these skills and put them into a document that created a shared language and allowed for more substantive conversations about instructional practices. Working together, the district teams defined what the skills look like at each grade level across the K-12 continuum and developed district-wide rubrics for assessing these skills.

The resulting *"habits of mind"* are: thinking, communication, collaboration, independence, and creative exploration. The *"habits of mind"* reflect the skills and competencies that are at the heart of the district's priorities for student learning. These skills are integrated with content throughout the curriculum and aligned with the statewide curriculum frameworks.

Defining the skills and measuring students' mastery of the skills, however, did not address how these skills should be taught. Again drawing on community-wide input, the district began to define its vision for what a 21st century learning experience should look like to guide district-wide discussions about instructional practices. *Five Common Elements of Powerful Learning* were developed to outline what students in Pentucket Regional School District should experience in their classrooms everyday:

1. **Experiential:** Powerful learning is learner centered, relevant and interactive.
2. **Ownership:** Powerful learning is personal and learners are empowered to shape learning outcomes.
3. **Forces One Out of Comfort Zone:** Powerful learning challenges the learner to take risks outside of his/her established areas of competence.
4. **Multifaceted Support:** Powerful learning occurs when the learner is put in a challenging learning environment that is supported by strong formal and informal systems.
5. **Reflective:** Powerful learning provides space for the learner to review their experiences and contemplate successes and challenges. Reflection leads to adaptation.

Rather than adopt a pre-packaged set of 21st century skills, schools and districts focus on particular skills and competencies that fit the needs of their student body. Even though Massachusetts is a member of the Partnership for 21st Century Skills (P21), none of the schools and districts studied have adopted the P21 framework in its entirety. Superintendents and principals explained that particular skills and competencies came to be part of the school/district mission and vision based on the immediate needs of their students as well as the skills and knowledge that the school community believes will help their students be successful after they graduate. For example, in districts that do not serve culturally and ethnically diverse student populations, like Whitman-Hanson Regional School District, increasing students' global awareness is viewed as an important aspect of preparing their students to enter and thrive in a diverse and globally-connected workforce. In other districts, like Arlington, the emphasis on building students' global awareness is driven by the shifting demographics of the community. And in districts that currently serve a culturally and ethnically diverse student body, such as Somerville, placing a high priority on global awareness honors students' cultures and takes advantage of the rich perspectives that students from different countries, cultures and religious backgrounds can provide.

In some urban districts like Springfield and Brockton, the re-thinking of priorities for student learning was spurred by students' poor performance on MCAS. In Springfield, the mission and values put forth by the district relate directly to the overwhelming need to raise the level of student performance for the entire district. Competencies and skills that are often referred to as 21st century skills are part of that effort. Springfield Public Schools Superintendent Alan Ingram does not talk about 21st century skills as a separate set of skills. Instead, he focuses on the need to increase achievement among all students in Springfield and believes that skills like creative thinking, reasoning, problem solving, communication and collaboration are essential to the district's broader efforts to raise achievement and prepare students for college and career.

Focusing on skills and competencies that fit the needs of the student body: Lilla G. Frederick Pilot Middle School

Lilla G. Frederick Pilot Middle School is a pilot school in the Grove Hall neighborhood of Dorchester. The neighborhood surrounding the school has some of the lowest levels of educational attainment and highest rates of crime and poverty in the city of Boston. Eighty-nine percent of the students attending the school are from low-income families, and according to Principal Deb Socia, the student body has some of the highest rates of obesity, asthma, HIV and sexually transmitted diseases among 12- and 13-year- olds in the state. While the school's mission is to provide a rigorous academic curriculum and to help students be prepared for the kind of work they will do as adults, school staff also address the needs of their student body—including their physical health. Principal Socia explains that the school serves *"the whole child—mind, body and spirit—as well as families and the community in which the children reside."* The school philosophy is that inquiry, exploration, experience, connections and hands-on learning all facilitate and complement the core academic curricula and support the school's vision of developing life-long learners.

This inner city school that serves a large population of low income students is unique in Massachusetts in that it has a one-to-one laptop program that provides one laptop for every student and every teacher. Most Frederick Middle students do not have computers and/or high speed Internet access at home, but because of the one-to-one laptop program, they have access to both at school. When asked about the laptop initiative, Principal Socia explained that she *"pushed hard"* to ensure that her students have good access to technology in order to overcome the disparity between exposure to technology of children in the Grove Hall community and children in wealthier communities. She explained, *"What we are trying to do, quite honestly, is to provide our children with all the same resources and opportunities that children who are affluent get. Just by virtue of being born to a poor family shouldn't mean that you don't have access. And so, that's been a big goal for us."* Principal Socia went on to say, *"The gap between the children who have and the children who have not has grown so extensively because of technology that it's frightening. The only way for our kids to compete is to ensure that our kids are literate around the use of technology, in addition to other areas."*

Other districts, like Reading, Arlington and Shrewsbury, expanded the definition of what students need to know and be able to do in order to better prepare their students for success in postsecondary education and careers. Reading Public Schools sought to find a balance between the content driven by MCAS and other career and life skills necessary in today's society. Arlington sought to build upon, not replace, the values and strengths of what the district already addresses: content-based standards. Former Superintendent Nate Levenson's initiative, "*Good to Great*," conducted in partnership with the Arlington Education Foundation culminated in a report to the school committee—*21st Century Skills, Knowledge, and Habits of Mind* which outlined key skills needed by students in the emerging global economy. Efforts in Shrewsbury were driven by a district-wide mission to prepare students in a new way. According to Superintendent Joseph Sawyer, "*There is a broad sense that we need to prepare our students to succeed in ways that are not narrowly defined by standardized test scores or very specific academic content and skill acquisition, but to take a more comprehensive approach that includes developing higher level proficiencies that help students make sense of and apply the content and skills that they learn.*"

Incorporating 21st century skills into teaching and learning is a process that takes time. Interviews with both superintendents and principals revealed that integrating 21st century skills into teaching and learning is viewed as a process that occurs over time. Most district leaders are proud of the progress they have made thus far but believe that there is more work to be done. The districts included in this study have some critical initiatives that integrate 21st century skills in place, but most superintendents say they have not yet fully embedded 21st century skills into curricula, instruction, assessment, professional development, teacher evaluation, and learning environments.

> "21st century learning is a marathon, not a sprint."
>
> Anthony Pierantozzi, Superintendent of Somerville Public Schools

While all of the school and district leaders in this study indicated that integration of 21st century skills is a priority, schools and districts vary in how far along they are in this process. Some began incorporating 21st century skills into the vision for student learning five or more years ago, while others have only recently begun to do so. As noted above, most districts in the study have gone through a strategic planning process which involved a reassessment of their priorities for student learning that included input from a broad range of stakeholders. For some districts, this process led to the adoption of a new strategic plan to better align resources to incorporate 21st century skills, while for others, the process simply validated work they had already been doing.

After the strategic planning process, most leaders' next step was to ground the work in instructional practices by addressing the question: How do you change teaching practices to ensure that students master both core academic content and develop 21st century skills? For districts like Reading, Whitman-Hanson and Watertown, the integration of technology as a tool to build student skills drove many of these discussions. Other districts focused on how to structure lessons and assignments to get students to work more collaboratively, communicate more effectively, develop strategies to solve problems, and take more responsibility for their learning.

Over time, districts included in this study have developed both formal and informal structures to support the integration of 21st century skills, including interdisciplinary teaching teams, new approaches to professional development, new student assessments, and some districts have begun holding teachers and principals accountable for fostering student mastery of 21st century skills in their classrooms and schools by including these criteria in formal performance evaluations.

Districts in the early stage of integrating 21st century skills have worked through the process of engaging with community stakeholders; established a vision, mission and goals that include 21st century skills; and district stakeholders came to consensus on action steps. For example, Brockton Public Schools' district-wide effort began with the adoption of a new strategic plan in 2010, but builds upon ongoing work that began in Brockton High School ten years ago. The district's strategic plan ties together all the efforts that have been going on at the school level to create a more coherent, district-wide approach. According to Superintendent Matthew Malone, the focus on 21st century skills is embedded across all the strategic priorities for the district. The district is moving into the next phase of work, which includes defining action steps and metrics to measure progress toward meeting each of their strategic objectives. A key outcome of this work will

be new measures of students' skills. As Superintendent Malone notes, *"What I see is the development of a whole series of rubrics down at the site levels that will have the ability to hold students accountable for mastering certain tasks."*

Districts further along in integration have embedded 21st century skills into their formal systems of professional development, student assessment and evaluation of teachers and principals. Pentucket is four years into their effort to integrate their *"habits of mind,"* but Superintendent Paul Livingston feels that they are two to three years away from the level of integration that they want. Superintendent Livingston notes that this work must be viewed as a long term change process. He and his leadership team were clear that to be both relevant and rigorous, there needed to be clear accountability for developing specific skills in students. As he notes, *"it's not enough to say that we want our students to be good collaborators."* Through teacher and principal teams, the district grappled with difficult questions: *How do you define the skill? How do you explicitly instruct the skill at all grade levels? How do you evaluate and assess student mastery of the skill?* This inquiry process helped educators make the skills more concrete and led to the development of district-wide rubrics for assessing various 21st century skills at all grade levels across the K-12 continuum. As part of this effort, the district instituted a robust performance assessment system for which all students are required to develop a portfolio with ten pieces of work that show mastery of 21st century skills and core content. In grades 4, 6, 8 and 11, students are required to prepare a public demonstration of their mastery of particular 21st century skills against grade level expectations embedded in district rubrics. Teachers are specifically directed to develop assignments that lead to deep integration and mastery of 21st century skills, and they are held accountable for this when they are evaluated. Principals, moreover, are held accountable for ensuring that district-wide goals and priorities are being implemented at the school level. Within two to three years, Superintendent Livingston believes that the district will begin including their assessments of 21st century skills on student report cards.

One area that seems to differentiate how far along schools and districts are in their implementation is the extent to which they are assessing 21st century skills. While interviews with educators revealed that assessment of 21st century skills does occur at the classroom level, common standardized rubrics that connect to the school or district strategy are less common. The survey results revealed that among the schools that have included particular 21st century skills in their mission/vision for student learning, most have not yet developed goals for measuring students' mastery of these skills. Most of the principals we interviewed indicated that school-wide assessment of 21st century skills that is linked to school goals is a later step in the process. The sentiment expressed by many principals was summed up well by J.F. Kennedy Middle School (Natick) Principal Rosemary Vickery: *"We're not as far along on [assessment] as I'd like. It's the next piece. Teachers are assessing 21st century skills as part of their regular habits, so it's alive in that way. But as far as assessing it across the school, we're not there yet."* She went on to explain that when you are incorporating 21st century skills into teaching and learning *"you can't take all of it on at once or it will collapse."* She elaborated *"I had to first lay out the framework. Teachers have the framework and it's now part of their everyday practice. The next step is to start talking with faculty about school-wide assessment."*

Three schools that have school-wide assessments of 21st century skills that are linked to school goals are Chatham High School, Oak Middle School (Shrewsbury) and The Springfield Renaissance School. Chatham High created school-wide rubrics to facilitate consistent classroom-level assessment of the school's academic expectations, which include 21st century skills (see text box on opposite page). At Oak Middle (Shrewsbury), report cards provide parents with indicators of how well their children are performing against grade level expectations for mastering certain 21st century skills, such as communication, collaboration, problem solving, responsibility and initiative. At Springfield Renaissance, students' mastery 21st century skills is assessed through "*Passage Portfolios*" and "*Senior Talks*" (see text box on opposite page).

Assessing students' mastery of 21st century skills

EXAMPLE 1
School-wide rubrics at Chatham High School

Three years ago, staff at Chatham High School created a new mission statement that focuses on 21st century skills. The mission statement includes four social expectations (work collaboratively, respect, tolerance of individual differences, and responsibility), two civic expectations (demonstrate the importance of participatory democracy and engage in community service), and eight academic expectations: 1) acquire the knowledge and skills to perform well on state and national standardized tests; 2) read critically and with comprehension; 3) communicate effectively through writing, speaking, and creative expression; 4) develop personal study skills that foster successful and lifelong learning; 5) be critical thinkers who can effectively solve problems; 6) successfully master basic technologies that enable communication, problem solving, and visual presentation; 7) develop a habit of self-reflection regarding their learning and 8) make connections between what they learn in school and the larger world.

Through teacher-led discussions, Chatham High staff created school-wide rubrics to facilitate consistent classroom-level assessment of the school's academic expectations. The rubrics include criteria for each academic expectation and four levels of proficiency: advanced, proficient, developing and not yet. For example, there are five criteria for measuring the expectation *"Make connections between what they learn in school and larger world"*: 1) community service, 2) application of learning, 3) career development, 4) assessment of media, and 5) presentation of ideas. In order to receive an advanced rating on *assessment of media,* for example, students must *"consistently evaluate information from media sources for validity and relevance."*

Chatham High has also determined which departments have primary and secondary responsibility for measuring each academic expectation. For example, the mathematics department has primary responsibility for the following expectations: acquire the knowledge and skills in the curriculum frameworks and be critical thinkers who can effectively solve problems, and has secondary responsibility for: developing personal study skills that foster successful and lifelong learning; successfully master basic technologies that enable communication, problem solving, and visual presentation; and make connections between what students learn in school and the larger world.

EXAMPLE 2
"Passage Portfolios" and *"Senior Talks"* at The Springfield Renaissance School

At Springfield Renaissance, all students must successfully present a *Passage Portfolio* before moving on to 9th and 11th grade and all seniors are required to give a *Senior Talk* prior to graduation. The Passage Portfolio is a collection of the student's best work in his/her courses accompanied by pieces of self-assessment, reflection, and goal setting. During their portfolio presentation, students present to a panel made up of peers, family, and school community members, as well as members of the community beyond the school building. Students describe what they have learned and why their work demonstrates their readiness to move on to the next level of school. Both the contents of the portfolio and the students' presentation are scored on a rubric. For example, students are scored on the extent to which their 11th grade portfolio shows mastery of at least four of the *Qualities of a Renaissance Graduate*:

- Communication
- Craftsmanship and Quality
- Inquiry and Investigation
- Critical Thinking and Analysis
- Creative Thinking and Expression
- Problem Solving and Invention
- Habits of Work

All seniors complete a Senior Talk prior to their graduation. Presented to a panel of students, staff, and community members, the Senior Talk demonstrates that the student is *"a self-directed learner ready to become an active citizen in our world and able to demonstrate the Qualities of a Renaissance Graduate."* The Senior Talk is scored on a rubric that includes four areas: content, students' appearance, delivery, and craftsmanship of final product.

Leaders create a culture of expectation that includes modeling of behavior and support. When asked what policies and procedures have been most successful in creating a culture that encourages and enables the integration of 21st century skills across grade levels and subjects, most school and district leaders indicated that strong leadership and establishing a culture of expectation is of utmost importance. Chatham High Principal Paul Mangelinkx explained that success in implementing 21st century skills across core subject areas in schools is not about policies, it is about leadership and skilled teachers. *"Without strong leadership to keep these ideas moving forward and central in school level discussions, they will not happen."* During the early stages of implementation, Principal Mangelinkx gave his staff copies of Tony Wagner's article, *Rigor Redefined* and discussed at length, Wagner's *Seven Survival Skills,* to reinforce the idea of providing students with a learning experience relevant to what they will need in the real world of college and career. He began to encourage teachers to set yearly goals to incorporate one or more 21st century skills into their instructional practices. He has increasingly held teachers accountable for making progress toward those goals.

At Shutesbury Elementary School, while teachers are not formally held accountable for it, the administration sets the expectation that they will integrate 21st century skills into teaching and learning and provides administrative support, teaching tools and professional development to support their efforts. Principal Robert Mahler believes it is important for school leaders to back up their words with their actions. He makes it a point to participate in *"tech time,"* a voluntary weekly professional development opportunity for teachers, because he believes it signals to the staff that he cares about it and supports it. He also points out, *"It is one thing to expect [the integration of 21st century skills] and another to provide administrative support to make it happen—we're doing both."*

Modeling of behavior occurs as part of Watertown Public Schools staff meetings and school committee meetings. These meetings begin with presentations of student work, sometimes by the students themselves. Student work may be showcased through an in-person presentation or through a web-based video clip of students' performances, which may take the form of a rap song or video journal. This portion of the meeting is intended to inspire other teachers and help them identify teachers they can approach to learn more. In this way, new ideas and teaching strategies are not restricted to individual classrooms, but spread throughout the district.

Teachers provide leadership that is essential for moving the integration of 21st century skills forward. All of the principals in the study spoke about the importance of including teachers in the strategic planning process and the importance of teacher leadership in the implementation phase. School and district leaders explained that incorporating 21st century skills into teaching and learning represented a philosophical change for their schools that required a shift in educators' thinking about instructional practices, as well as changes in the school culture. Most principals and superintendents indicated that within each school building there was a core group of teachers enthusiastic about the change, as well as teachers who were skeptical. Both superintendents and principals described the importance of getting all of the teachers *"on board"* and empowering enthusiastic and committed teachers to lead the way. For example, Shutesbury Elementary Principal Mahler described the importance of connecting with those educators in the building who are willing to change first and having them lead the initiative. Principal Stephen Mahoney of Springfield Renaissance spoke about the value of what he calls *"leading voices"*—the teachers, guidance counselors, coaches and other staff who can *"lead the charge"* to bring the rest of the staff on board.

In most schools and districts, teacher-led groups have been essential in building support and keeping the momentum going, ensuring that school and district priorities are integrated into school-level discussions about curriculum, instruction and professional development, and leading particular initiatives. At Birch Meadow Elementary School (Reading), there is a core group that is integrating new and innovative instructional practices (particularly for the use of technology) and is encouraging peers to integrate these approaches in their own classrooms. The importance of teacher leadership was also highlighted by Reading Superintendent Doherty whose advice for moving the work forward is to put the work in the hands of people who are the *"go-getters."* He suggested, *"don't put a lot of restrictions on them"* and went on to explain that it is important to give innovative teachers the flexibility and autonomy that allows them to change the culture of the school and ultimately the entire district.

From the moment Principal Socia began considering the one-to-one laptop program at Frederick Middle (Boston), she involved teachers. She asked teachers to volunteer to be part of the decision making process and once the decision was made to participate in the program, she pulled together a team of teachers, community members and families to make key decisions, such as what type of laptop computers to buy. The process of incorporating the laptops into the building was also led by a team of teachers called the *"Teaching, Learning and Technology Team."* The team came up with a list containing three columns—things teachers must do, should do and could do. Over time, as the implementation moved forward, the team moved items from the *should do* column to the *must do* column and from the *could do* column to the *should do* column. The team also organized *"Friday morning bagels and laptops,"* a weekly meeting where teachers train their peers on the use of instructional technology. Principal Socia said, *"This team has been powerful. It's an amazing team that runs itself."*

"Home grown" experts provide in-house training, professional development and support for teachers. Both principals and superintendents spoke about the importance of training and support for teachers. A common approach for integrating 21st century skills among the schools in our study was in-house training. For example, the *"Technology Support Team"* at Birch Meadow Elementary (Reading) is a teacher created group to assist peers in using instructional technology. Similarly, *"Friday morning bagels and laptops"* at Frederick Middle (Boston) and *"tech time"* at Shutesbury Elementary are opportunities for teachers to learn how to use technology from the experts that exist among their colleagues.

As part of their efforts to strengthen instructional practices and integrate 21st century skills across all grades levels and subjects, Oak Middle (Shrewsbury) has focused more intentionally on creating high-functioning, interdisciplinary learning communities over the past five years. Additionally, the district has created the *"Teacher Technology Leaders"* program (TTL) to provide certain teachers with targeted professional development in instructional technology in order to build district capacity to provide workshops and other forms of technical assistance to their colleagues.

In-house training, professional development and support: Watertown Public Schools

"Technology in Practice" (TIP) is a district-wide professional development program *"for teachers, by teachers"* in Watertown Public Schools. TIP provides a variety of mini-courses taught by teachers in Watertown and offered over the course of the school year. Courses are designed based on information gathered from a survey conducted by the district each spring called *"Watertown Talks Tech."* Placement in the course is based on teachers' self-assessment of their level: Emergent, Proficient, or Advanced. Some TIP courses are recommended for certain department members. The goal of the professional development program is to provide teachers and administrators with the opportunity to learn to use one or more new technological applications in their classrooms. Superintendent Koufman-Frederick explains, *"We keep supporting teachers, administrators and students not only to do things differently but to do different things."*

> "Technology isn't what we teach, it is how we teach."
>
> Deb Socia, Principal of Lilla G. Frederick Pilot Middle School (Boston)

Technology is a teaching and learning tool. The schools in the study differ in the amount of technology they have available for student use—from Frederick Middle (Boston) where every student has a laptop to Kennedy Middle (Natick) where there are about 550 students, but just one computer lab in the school with 25 computers and one iPod Touch[27] lab that consists of 40 devices on a rolling cart. Interviews revealed that schools and districts that do not have a lot of technology have set goals for acquiring and teaching technology. Once technology has been incorporated into the school culture, there is shift away from explicitly teaching technology to using technology as a teaching and learning tool. For example, Superintendent Ruth Gilbert-Whitner at the Whitman-Hanson Regional School District explained that many years ago the district's strategic plan had technology as a separate area of focus, and there were specific goals related to it. In the more recent strategic planning efforts,

27 An iPod Touch is a portable media player on which users can access the Internet through a wireless network. For more information, see http://www.apple.com/ipodtouch/

it became evident that technology has become so integral to everything they do that it needed to be embedded in all of the goals, rather than listed as a stand-alone goal.

In schools that have higher levels of technological resources and capacity, technology is viewed as a teaching and learning tool. Principals acknowledged that while students do have to learn how to use the tool, instruction on how to operate the technology is a very small part of what teachers are teaching. The focus is on using technology to improve learning. Computers are viewed as a learning tool in the same way that textbooks, workbooks and encyclopedias are viewed as learning tools. Teachers begin by identifying the content and skills they want students to acquire and then consider how technology might help them teach it or how technology might facilitate the learning of that content and skills.

There is a new and emerging role of the library and the librarian. School and district leaders spoke about the changing role of the library and library personnel. In some of the studied schools and districts, libraries have been transformed to library and media centers which are seen as a valuable resource and an integral part of students' educational experience. Library personnel, often referred to as Library and Media Specialists, are knowledgeable about the curriculum and work closely with teachers to support teaching and learning. Many school and district leaders believe technology, media and information literacy are particularly important in today's media- and information-saturated society and view the role of the Library and Media Specialist as critical in building these skills. Superintendent Gilbert-Whitner of Whitman-Hanson explained that their Library and Media Specialists do more than help students find and check out books from the library. They create educationally-based websites that are linked to the curriculum and work closely with classroom teachers to support what they are teaching. In Reading Public Schools, library media centers have been transformed to reflect 21st century learning environments, and librarians are active teachers who build media literacy and research skills.

At Shutesbury Elementary, Library Teacher Marcia Bernard and Technology Coordinator Debbie Lee have moved the school away from the old concepts of the library as a place where students check out books and the computer lab as a place where students type up their assignments. Their focus is on building information literacy skills among both students and teachers. Ms. Bernard and Ms. Lee work with the classroom teachers' curricula to provide the content for teaching information literacy. They do not believe in a stand-alone library or computer curriculum, rather the focus is on using content from the classroom to teach information literacy. Ms. Barnard explained that while they do teach students how to find information, the focus is on teaching students how to sort through *"the bombardment of information that they have access to now."*

The Watertown Public Schools are transforming their libraries into *"learning centers"* that function as *"common areas where learning and creativity take place."* In addition to housing traditional print materials, these learning centers include opportunities for online learning activities, global collaboration, and community presentation spaces. According to Library, Media and Technology Specialist Toni Carlson, the learning centers in the elementary schools can be found to have students *"recording their own podcasts, making movies and working on different online applications."* Watertown Middle School's learning center has instituted *"listening lunches"* during which students perform with *"music, poetry readings and other presentations."*

Schools grounded in 21st century skills

Two of the participating schools, Hill View Montessori Charter Public School and The Springfield Renaissance School, were founded with an instructional philosophy that embodies many 21st century skills. Unlike the other schools in the study, these schools did not go through a process of integrating 21st century skills into teaching and learning, rather, 21st century skills were part of their original mission, vision and instructional philosophy. A brief overview of the schools is provided below. Examples of instructional strategies employed in these two schools are included in the section that follows.

EXAMPLE 1
Hill View Montessori Charter Public School

Our mission is to provide a grade K-8 public education that promotes academic excellence using the Montessori philosophy. In partnership with teachers and parents, children attain high levels of academic, personal, and social achievement and so prepared, become constructive contributors to our community.

Hill View Montessori Charter, located in Haverhill, Massachusetts, is a public charter school that serves urban students in grade levels K-8. The school offers students differentiated curriculum and instruction in multi-age classrooms (with the exception of a single grade kindergarten). Learning is maximized by teaching to students' individual academic levels and by leveraging each child's unique learning style. Hill View Montessori is committed to character education and integrates this into the Montessori classroom with ongoing lessons in grace, courtesy, respect and responsibility. The school's vision is for students to attain academic excellence, be intrinsically motivated, independent thinkers who love to learn, socially responsible and mature contributors to the world.

What is Montessori?

The Montessori Method is a student-centered educational method based on theories of child development originated by Italian physician Maria Montessori (1870-1952). The methodology is characterized by an emphasis on self-directed inquiry on the part of the student, preparation of a "prepared environment" by the teacher to foster learning, and the use of self-correcting materials that introduce complex and abstract concepts concretely.[28]

EXAMPLE 2
The Springfield Renaissance School

Our school's mission is to provide a rigorous academic program for college-bound students in a small, personalized setting that impels and supports students to use their minds well, to care for themselves and others, and to rise to the challenges and duties of citizenship.

Springfield Renaissance, located in Springfield, Massachusetts, is a public school that serves urban students in grades 6-12. It is an expeditionary learning school that focuses on interdisciplinary work grounded in "real world" problems, called "*learning expeditions,*" that encourage deep thinking, collaboration and community service and that result in presentations of student work before audiences that include teachers, families and community members.

What is Expeditionary Learning?

Expeditionary Learning is a model rooted in the philosophy of the Outward Bound wilderness program. It is built on ten design principles that include self-discovery, fostering curiosity about the world, responsibility for one's own learning, empathy and caring, confidence to take risks, collaboration, diversity and inclusion, respect for the natural world, self-reflection, service and compassion. Core practices include learning expeditions; teaching reading and writing across the curriculum; inquiry-based mathematics, science and social studies; building a safe, respectful and equitable school culture; fostering character development; shared leadership; school improvement through the use of multiple sources of data; designing time for student and adult learning and creating structures for knowing students well.[29]

28 Description of Montessori Method retrieved from: http://www.hillviewmontessori.org/index.php/about/about-montessori.
29 Description of Expeditionary Learning retrieved from: http://elschools.org/.

Findings from interviews with educators

The following section is based on interviews with educators in schools whose leaders indicated that 21st century skills are a high priority. The purpose of interviewing educators was to better understand *how* teachers incorporate 21st century skills into teaching and learning, and to identify common strategies for increasing student mastery of both 21st century skills and core content. As described in the Purpose and Methods section of the report, principals of participating schools were asked to select two or three educators from a variety of subjects and grade levels, who they believe do an outstanding job of incorporating 21st century skills into core subject matter classes. Interviews with the educators shed light on *how* they integrate 21st century skills and *why* they view 21st century skills as important. The instructional practices described by teachers are showcased here to illustrate the integration of 21st century skills. Rather than serving as exemplars to be imitated, the practices highlighted in this report are intended to provide clarity about what the integration of 21st century skills looks like in the classroom.

The public debate about 21st century skills has made evident some misperceptions and lack of clarity about what teaching and learning in classrooms that incorporate 21st century skills looks like. Specifically, some believe that spending time teaching 21st century skills means less time spent teaching specific core academic content. Overall, educators interviewed for this study indicated that they regularly incorporate 21st century skills into the teaching of core content, not as an add-on, but as integral to the delivery of instruction that, in turn, has a positive impact on their students' learning and levels of engagement. The instructional strategies commonly used by educators in this study include providing opportunities for students to apply their knowledge in real world situations, making connections across disciplines, project-based learning, collaborative work, and engaging students as active and self-directed learners. Many of the strategies described in this section are not new; however, they are important to highlight because they are deliberately used by educators to build student mastery of 21st century skills. Common themes and examples from the interviews with educators are presented below.

Educators indicated that incorporating 21st century skills into the teaching of core content has a positive impact on student learning and engagement. Teachers indicated that infusing 21st century skills into lessons and assignments makes the lessons more interactive, relevant and engaging for students and improves student learning. Many explained that integrating 21st century skills with core content helps students gain a deeper understanding of the content while also teaching them how to think and solve problems beyond the specific task at hand. Approaches educators use to integrate content and skills provide students with opportunities to interact with their classmates, address real world issues and display their understanding of content in various ways which, in turn, allows teachers to better assess individual students' strengths and weaknesses.

> "21st century skills are not extra—they're just good teaching."
>
> Elizabeth Kaplan, 7th science grade teacher at Watertown Middle School

Among the educators we interviewed, most believe that instructional practices that incorporate 21st century skills improve their teaching. Many of the teachers explained that incorporating 21st century skills like creative thinking, critical thinking and problem solving into lessons better enables them to teach for understanding and deepen content knowledge, particularly when teaching a classroom of students with different learning styles. Educators from across grade levels and disciplines gave a range of examples to illustrate how incorporating 21st century skills into the teaching of core content has a positive impact on student learning and engagement. A few of these examples are described below.

In Melissa Fleishman's 5th grade science class at Birch Meadow Elementary (Reading), students work in groups to create video and photo stories that represent what they have learned during a lesson about a specific element of sound (such as volume, pitch or damping). Through collaboration and the use of technology, this project-based lesson keeps the students engaged, results in fewer classroom disruptions, and reinforces students' understanding and retention of the scientific principles of sound. The lesson is part of a Museum of Science curriculum on the engineering design process, and the completed projects are posted online, where students receive feedback from professionals at the Museum of Science and parents, as well as provide feedback to each other. According to Ms. Fleishman, students develop their own skills in providing effective feedback and enjoy having professionals comment on their work.

When Melissa Graham, an 8th grade teacher at Frederick Middle (Boston), teaches a history lesson, she wants her students to understand why the historical event took place and what impact that event had on society. Dates, places and other facts are just part of the focus of Ms. Graham's lessons. In addition to this content, she teaches her students to critically evaluate the circumstances that led to a particular event and the outcome, and to look for common themes across different historical events that the class has studied. She creates situations where her students have to draw on and apply what they learned earlier in the year to better understand a historical event they are currently studying or a current event. Ms. Graham believes that making these connections and critically evaluating historical events and their causes, deepens students' understanding, aids in their retention of information, and better enables them to apply what they have learned to new situations.

Brockton High English teacher Jodie Nelson teaches all 10th grade classes of *"reluctant learners"* who are placed in what is called the *"college preparation (CP)"* class due to a number of factors, including poor academic performance, poor attendance and behavior issues. Since taking over the class, Ms. Nelson's students' performance on MCAS has improved each year—as measured by the Composite Performance Index (CPI). Ms. Nelson incorporates the set of skills that this study defined as life and career skills, and learning and innovation skills to engage students with the core ELA content. For example, in teaching a lesson on identity, Ms. Nelson uses a science fiction book about a society run by the strict dictates of a schedule. To reinforce what they are learning, Ms. Nelson uses time cards to track how students are using their time in class and out of class. Students are required to communicate with their other teachers and parents (referred to as "bosses" for the lesson) on how they are using their time and must ask them to sign off on the cards. Students learn to be self-directed and accountable for their decisions and must effectively communicate the reasons for those decisions to adults in positions of authority. Reward comes in the form of a grade that Ms. Nelson refers to as the students' "pay." By making the process of learning tangible to students, Ms. Nelson found that tardiness declined, attendance increased and homework completion increased.

Intentional integration of 21st century skills involves backward planning and taking students' interests into consideration. Teachers in the study intentionally integrate 21st century skills into lessons and assignments as part of their planning process. Their process typically begins by reviewing the state frameworks and considering how particular 21st century skills can be incorporated, as well as how to make the content interesting to students.

When planning lessons, Arria Coburn, a 7th grade special education teacher at Springfield Renaissance uses the state frameworks as a starting point and deliberately builds additional knowledge and skills, which are often 21st century skills, into lessons and assignments. *"When I come up with lesson plans for my students, I say: Here is what they have to learn according to the state standards. And then I ask myself: How can I take it further?"* She also considers how she can connect the academic content with students' interests. She explains, *"I have to teach these mathematics concepts. If it's not at a student's entry level, I lose them. If it's not at a student's interest level, I lose them."* To address these issues, Ms. Coburn relies on information she obtains through a student interest survey. She administers the survey to students before every unit to gauge how much they know about the topic (what she refers to as a student's *"entry level"*), the interests they have that connect to the topic, and how they would like to be assessed on the unit. Last year, Ms. Coburn learned that her students watch a lot of cooking shows, so she created a mathematics unit that capitalized on their interest in cooking. Students used food packages and information on nutrition labels as the basis for mathematics problems on percentages and surface area while also learning about nutrition, diet, exercise and the issue of childhood obesity. Through this unit, students deepened their understanding of mathematics and improved their health literacy.

The humanities faculty at Frederick Middle (Boston) developed a common curriculum for use in the school's four academies. To do this, the humanities team worked together to write lessons to address the state's standards and included particular 21st century skills that most closely align with the standards. Ms. Graham, an 8th grade humanities teacher at the school, explained that prior to using a particular lesson plan, she thinks about how she can build additional skills into the lesson or modify the lesson to better suit the needs and/or interests of her students. In one case, Ms. Graham developed

a webquest[30] for her students, which required them to find information online rather than simply reading the information in their textbooks. As part of this lesson, Ms. Graham solicited the assistance of the school librarian to work with the students on using the online library databases to find journal articles and other reliable sources of information. The core content learning goals for the webquest were the same as those in the original lesson plan, and the students answered the same questions that they would have answered had they used the textbook to complete the assignment. The advantage of the webquest was that it helped students build their information and technology literacy skills. Students learned how to access reliable information through the Internet and online databases, manage the flow of information from a variety of sources, evaluate the information and quality of the information sources, and appropriately cite sources.

Arlington High School English teacher Paul McKnight strives to provide students with a strong foundation of content based on statewide standards, while also integrating 21st century skills. More specifically he tries *"to get to the analysis and application level of Bloom's Taxonomy."*[31] Mr. McKnight helped revise the school's American Literature curriculum to incorporate social studies and current events to make it more relevant to students' experiences. For example, to reinforce literary themes found in *The Scarlet Letter,* students consider contemporary efforts to shame people who commit certain crimes through public displays of humiliation. Moreover, to further connect with students' interests, Mr. McKnight capitalizes on how students communicate with each other outside of the classroom by creating online spaces for students to discuss their ideas. *"So many of the pieces of technology are second nature to students, and my old M.O. was to really slow down the pace of things, but they can access and use technology much more quickly…I've had to learn to trust their adeptness."* By freeing students to collaborate and complete assignments through various online media, including blogs, social networking websites, or wiki[32] pages, Mr. McKnight believes that the overall level of discussion and analysis about works of literature has improved. He explains, *"by establishing a broader audience, that is different from the teacher, students are more likely to generate more meaningful responses."*

Educators provide opportunities for students to apply their knowledge and skills in real world situations. An overarching goal of education is for students to be able to take what they have learned in school and apply it in other situations, including college, the workplace, at home and in their communities. Many educators we interviewed do this through lessons that connect core content to current local or global events or issues. Another way to teach students how to apply their knowledge and skills to real world situations is to structure learning in the context of a project. Educators view project-based learning as a way for students to immediately connect content that they have learned in the classroom to a real world problem or situation. There is also a strong belief among the educators interviewed that project-based learning and other types of instruction that help students link their learning to the real world, promote greater understanding of core content, and many school leaders interviewed for the study agreed. According to East Somerville Community School Assistant Principal Laurel Bonnell, *"The more school is like real life, the better. Students know when learning is authentic."*

Educators from across grade levels and disciplines gave a wide range of examples of project-based learning and opportunities for students to apply their core content knowledge and 21st century skills in real world situations. Some examples from recent school years are highlighted below.

- **Students as entrepreneurs.** Third graders in Mary McClellan's class at East Somerville Community built their writing, business and financial literacy skills by developing a business plan for opening their own restaurant as part of a lesson developed by Junior Achievement[33] volunteers. Students decided on the location, menu, prices, and how many employees to hire. Ms. McClellan extended the lesson by having students develop advertisements and write restaurant reviews.

30 A webquest is an inquiry-oriented lesson format in which most or all the information that students work with comes from the Internet.

31 Bloom's Taxonomy is a classification of learning objectives commonly used within education.

32 A wiki is a website that allows the easy creation and editing of any number of interlinked web pages via a web browser.

33 Junior Achievement (JA) is an organization dedicated to educating students about workforce readiness, entrepreneurship and financial literacy through experiential, hands-on programs. JA uses volunteers from the community to deliver curriculum and share their experiences with students.

- **Students as designers.** As part of a mathematics unit, Heather Lobenstine's 4th grade students at Shutesbury Elementary worked collaboratively to design an amphibian park that featured habitats for the amphibians and accommodations for visitors, including bathrooms, walking paths and parking spaces. To create the park, students had to draw on and apply what they had learned about amphibians as part of a science unit. Students presented their final plans to 5th grade students in the school. Through this unit, students deepened their understanding of both mathematics and science, while improving their collaboration and communication skills.
- **Students as architects.** Kristen Bilodeau, of Hill View Montessori Charter, developed an architecture project as part of her 4th, 5th, and 6th graders' mathematics unit that involved designing their own dream house. To create their plans, students had to draw on and apply what they had learned about the architecture of Frank Lloyd Wright as part of a history unit. Students used their mathematics, creativity and innovation skills to design layouts and architectural plans for their dream houses and some students went on to build models to scale.
- **Students as doctors.** Applying the knowledge they obtained from studying infectious diseases, viruses and bacteria, 7th grade students in Karen MacAulay's science class at Watertown Middle worked in teams to analyze the symptoms of a patient and recommend a course of treatment. In this way, students functioned as though they were part of an actual medical team to collaborate, interpret information and draw conclusions in order to determine the best treatment for each team's patient.
- **Students as scientists.** As part of a science project, Aurora Kushner's 9th grade students at Springfield Renaissance studied the water quality at Loon Pond and prepared a written report of the study findings to help the city establish priorities and strategies for re-establishing the pond as a recreation area. The project improved students' science skills, sense of civic engagement and communication skills.
- **Students as survey researchers.** Students in Kaitlin Clark's mathematics class at Brockton High developed a school-wide survey of student attitudes toward and experiences with alcohol, drug use, sexual activity and violence. By providing students the opportunity to research topics relevant to their real world experiences, Ms. Clark more effectively engages them with the mathematics concepts and skills involved in analyzing data, presenting findings in both graphical and written formats and presenting the findings to the audience.

Students are active collaborators in the teaching and learning process. Responsibility, initiative and self-direction are often considered 21st century skills and are among the skills included in this study's definition. Findings from our statewide survey revealed that district leaders believe it is important for educators in their districts to teach lessons and give students in-class and homework assignments that are designed to enhance students' mastery of these skills. Furthermore, 81% of participating district leaders indicated that it was a priority for educators to construct lessons that enable a student's progression from teacher-led to self-directed learning. One way educators foster responsibility, initiative and self-direction in their students, is by engaging students in the planning and implementation of classroom activities. Educators in this study empower students to have control over their learning by routinely providing them with choices about what they are going to learn and how they are going to be assessed. In some schools, including Hill View Montessori Charter and Springfield Renaissance, students take responsibility for leading their parent-teacher conference. For example, at Springfield Renaissance, student-led family conferences are held at least twice a year. During these conferences, students lead a discussion of their accomplishments, needs, and goals as learners based upon work they have collected in what the school calls their "*classroom working folders*." At the end of the conference, the student, his/her family member(s) and the teacher agree upon and sign a *success plan* for the following trimester.

> "One of the most important things we need to do is get the students invested and involved, and empower them to have some control over what they are going to study, how they are going to study it and how they are going to present their learning."
>
> Ali Vandenburgh, 7th grade teacher at Hill View Montessori Charter

East Somerville Community has implemented *"reciprocal teaching,"* a district-wide strategy in which English language arts teaching takes the form of a dialogue between teachers and students regarding segments of text. The teacher and students take turns assuming the role of teacher in leading this dialogue. Over the course of the school year, students assume more and more leadership of the lesson and the teacher becomes a guide and facilitator. First grade teacher Betsey Reardon, uses reciprocal teaching to help students learn to engage in dialogue with one another about what they are reading as well as to bring deeper meaning to the text and improve students' comprehension.

In Ms. Vandenburgh's 7th grade classroom at Hill View Montessori Charter, students are active collaborators in the teaching and learning process. Ms. Vandenburgh regularly provides her students with choices of essay topics, for example, and empowers her class to develop the rubrics that will be used to score them. Students also actively collaborate on what they are going to study. For example, Ms. Vandenburgh and the team of middle school teachers started this past school year by asking students what is important to them and what questions they have about themselves, their families and the world. She facilitated the class discussion and recorded their questions on chart paper. Conflict emerged as a common theme. Among the questions students posed were: *"Why do we have wars?" "Why are my parents divorced?" "Why do people talk about each other behind their backs?" "Why does my mom yell at me when I do certain things?"* Since war is the biggest form of conflict, the class decided to study war in the United States. Ms. Vandenburgh asked her students to take the lead on deciding how they were going to study war. Through a class discussion facilitated by Ms. Vandenburgh and the other middle school teachers, students decided to study war by breaking into groups. Each group was responsible for researching a particular war. They sought to answer questions like: *Why did we go to war? What was the result of the war? How did things change after the war?* The teachers provided the students with some resources, directed them to particular library resources, and guided them in their exploration of information on the Internet. The entire class charted the wars on a timeline, discussed each war and looked for themes across the wars. Students then presented their timeline of wars in the U.S. to students in the lower grade levels.

Oak Middle (Shrewsbury) 8th grade English language arts teacher Derek Pizzuto facilitates self-directed learning in his class through group work. For a recent unit on the novel *Under the Persimmon Tree*, groups consisting of four to five students were given both group and individual tasks and an end goal to have a book read, annotated and ready for discussion by a certain date. Discussions, which are entirely led by students, focus on individual tasks, such as identifying the primary sources of conflict in the text or analyzing certain passages based on students' own perspectives and experiences. Students are given the flexibility to plan their work themselves, supported by periodic conferences with Mr. Pizzuto. *"Different groups work at different paces,"* Mr. Pizzuto notes, *"and the goal is that you have a deadline, but what you do to get there is up to you."* For students who are not able to manage their work independently, Mr. Pizzuto or his co-teacher provide weekly plans until the student is able to develop one on his/her own. *"The goal is for students to internalize the process."* On the day when groups present their work, Mr. Pizzuto runs the class as a Socratic discussion led by students. To do this, the classroom environment is structured with two rings of students; the students on the inside present while the students on the outside comment and provide feedback.

Marisa M. Vanasse, who has taught both middle and high school history at Springfield Renaissance, strives to help her students think differently about history, develop a high level of awareness and open their minds to new and different perspectives. To do so, she taps into what her students find interesting and how it connects to their local community, and she allows her students to take the initiative in developing project ideas. A strong example of this occurred shortly after students in Ms. Vanasse's class started to study the U.S. during the pre-Columbus era. A student brought an article to class that concerned the use of Native American mascots. Ms. Vanasse distributed the article to her students, and they got *"all fired up"* because an entire group of people was being used as mascots for sports teams. They not only wanted to learn more about the history of Native Americans, they wanted to do something about the use of Native American mascots. According to Ms. Vanasse, the idea for the project was completely driven by the students, not by her. The students learned about resources they could use in their community and at the state and national levels. In addition to library and internet research, they visited the Pequot Museum in Connecticut, interviewed a local member of the Seneca nation, a board member from the Massachusetts Center for Native American Awareness, and the founder of the

New England Anti-Mascot Coalition. They developed a website and used presentation software to share what they had learned. The students prepared a written document titled *A Proposal to Eliminate Native American Mascots* as the final product. Students presented their proposal to students at a local university and to the school committee of the neighboring community, which was making a decision about whether to remove the school's Native American mascot. Throughout the course of the project, the students developed what Ms. Vanasse describes as *"amazing skills"* in a number of areas including research, information literacy, understanding and addressing an important cultural issue, exercising the rights of citizenship, leadership, collaboration, presentation, and writing, while also learning U.S. history.

Technology is a teaching and learning tool. As is the case with school and district leaders, the educators interviewed for this study view technology as a teaching and learning tool. Educators explained that when they are planning a lesson, they begin by identifying the content and skills they want students to acquire and then consider how technology might help them teach the content or how technology might facilitate the learning of the content and skills. Interviews revealed that the focus is on using technology to improve learning. Educators talk about technology as a tool in the same way they talk about textbooks, workbooks and encyclopedias as learning tools. For example, Ms. McClellan, at East Somerville Community, uses technology to take her 3rd grade class on virtual tours of historic places. Students then use what they have learned about these sites as primary and secondary information in writing their first research report. Teachers whose students use technology to create videos, photo stories, audio stories and other types of multi-media products believe that providing students with these additional options for working with content and presenting what they have learned, serves to deepen and reinforce students' understanding and often leads to further questions and areas for inquiry.

> "I first focus on content and skills, then on the technology that might help students learn it."
>
> Kraig Gustafson, 9th and 10th grade history teacher at Watertown High

At Birch Meadow Elementary (Reading), 4th grade teacher Courtney Quinlan uses a variety of tools, from SMART Boards[34] and electronic sketch pads to web-based mathematics and literacy games to improve how students are introduced to content and engage in lessons. Ms. Quinlan uses wikis with her 4th grade class for a "Read Across America" project that requires students to assess and write about the books they selected as the best children's books in Massachusetts. Students track and analyze books and are responsible for creating wiki pages on each one, on which their peers, teachers and parents can comment. It is a lesson that builds students' literacy in technology and is part of a broader district-wide effort to build elementary students' ability to analyze texts and develop the critical thinking skills that students will need to be successful in middle and high school.

For several years before moving into her current position as the coordinator of the English Language Learners (ELL) Program at Frederick Middle (Boston), Nina Lessin-Joseph taught ELLs at Frederick Middle in grade levels 6 through 8, most of whom were new to the U.S. Her main goals included creating a classroom environment where students could practice speaking in English as often as possible and could feel comfortable making mistakes, thus allowing them to take more risks in pushing their language skills further. The technology available to her students at Frederick Middle helped her accomplish both of these goals: all students at Frederick Middle are assigned their own laptop at the beginning of the year. While she knew that having students give individual presentations in front of the class had benefits, Ms. Lessin-Joseph adapted the idea to better meet her students' needs by asking them to use the camera on their laptop to record their presentations. All students in the same class were able to create their own presentations simultaneously—which is incredibly helpful in larger classes—and then the next day, each student in the class would view and evaluate four of their classmates' video presentations. They would also watch their own again, which Ms. Lessin-Joseph sees as vital to the language acquisition process: *"This process gives students a safe environment in which they can not only evaluate their own work in a more objective manner, but also see their own progress in a tangible and encouraging way."* Using technology in this manner helped Ms. Lessin-Joseph move towards her classroom goals for her students; now, as the ELL Coordinator, she works with both English as a Second Language and mainstream teachers of ELL students to share these techniques.

34 SMART Boards are interactive whiteboards sold by SMART Technologies, http://smarttech.com/.

As English teachers, Mr. McKnight of Arlington High and Mr. Pizzuto of Oak Middle (Shrewsbury), are well-versed in the traditional method of having students study novels through completing reading logs, reader reflections, or answering key questions about plot, themes or character development. Both teachers, however, wanted to improve the quality of discussion and analysis of literature and get students to talk more with each other about what they are learning, so they decided to create online environments that facilitated increased discussion and analysis. One strategy used by Mr. McKnight is to group pairs of students to engage in an ongoing dialogue about books using email, social networking websites, or blogs. The technology allows Mr. McKnight to monitor these discussions online and raise additional questions for the students to consider. Through this process, Mr. McKnight's prompts have become less prescriptive and the quality of students' oral and written analyses has improved. Mr. Pizzuto also creates online environments through discussion boards linked to individual lessons for students to discuss the novels they are reading in class. For Mr. Pizzuto, engaging with students in this way also builds critical skills students will need to be productive professionals in an interconnected world. *"The sooner students get that mentality where things are not in discrete packets, where there are not walls between curriculum areas, the better off they are."*

21st century skills are assessed at the classroom level. While most schools and districts have not developed measurable goals for student mastery of 21st century skills, interviews with both administrators and educators revealed that 21st century skills are assessed at the classroom level. Most of the teachers interviewed for this study indicated that if the learning goals for an assignment include a particular 21st century skill, then students are assessed on both the core content and the 21st century skill. These types of assessments are designed to measure skills such as how well students worked within teams; their ability to address problems creatively; their use of information to make connections between content and real world experiences; and their ability to communicate their ideas effectively. Teachers also indicated that they provide students with multiple opportunities to demonstrate what they have learned during the course of a particular unit. Projects, for example, often involve different components that are assessed separately. Some educators also emphasized the value of having students provide one another with feedback and the importance of providing students with the opportunity for self-reflection. The following examples illustrate some of the ways in which 21st century skills are being assessed at the classroom level.

At Kennedy Middle (Natick), Stacy Gauthier, a 7th grade physical science teacher, has students in her morning class collaborate with students in her afternoon class on an experiment. All of the collaboration occurs through written communication using blue books. Ms. Gauthier explained that she is trying to simulate the real world situation where colleagues in the workplace do most of their collaborating through email and other written documents, but without the technology. She goes on to explain: *"I work with them on how to word things because so much of our communication is not in person and there can be misinterpretation in terms of tone."* In order to earn an "advanced" score on the experiment, teams must meet the following criteria: 1) Communication between teams is clear, meaningful and helpful. 2) Diagrams are included and data are reported. 3) Bluebook work is thorough. Ms. Gauthier explains, *"We talk about what it means to be meaningful and helpful. We talk about the difference between kind and helpful words and those that you should not write. I want them to have an understanding of how what they have written will be interpreted."* In addition to assessing students' communication skills, she assesses the accuracy of the scientific data and diagrams that students include in their blue book communication. While the technology is not yet available in the school for students to use blogs or email for the project, the underlying skills students use for the assignment are the same. Ms. Gauthier explains *"We're doing what we can to put into practice things that we know will help kids enter the world of work, and we can make it even better when we are using the same communication tools they will encounter."*

Cory Gunther's 10th grade biology classes at Arlington High must complete a three-week unit on evolution during which they work in groups to produce a website using wiki pages. Each group is required to produce a webpage that reviews a specific chapter from their textbook. They are also required to teach a lesson from the chapter as a group. For this project, students are assessed on their understanding of concepts related to evolutionary biology as delineated in the state stan-

dards, as well as their ability to work as a team to complete the project. The websites are evaluated based on five areas: 1) coverage of topic; 2) use of technology; 3) ease of use; 4) visual presentation of information; and 5) unique thought.

During lesson planning, Chatham High mathematics teacher Kelly Terrenzi looks for ways to build 21st century skills into her units, including collaboration, technological fluency, problem-solving, critical thinking, civic literacy and communication. Ms. Terrenzi teaches core mathematics concepts through projects based on real-world scenarios, such as urban planning, mapping, voting and apportionment methods, and the U.S. Census that culminate in a student or group performance. Aided by Chatham High's development of school-wide rubrics to assess students' mastery of 21st century skills, Ms. Terrenzi can evaluate not only how well students have mastered mathematics concepts, but also their proficiency across the school's academic, social and civic expectations. When students present their end-of-lesson projects, Ms. Terrenzi uses the rubrics to assess students across multiple indicators linked to those expectations, including their approach to solving problems, their ability to make connections across core subject areas, their use of technology and their ability to communicate effectively. Common assessments, moreover, allow Ms. Terrenzi to collaborate more effectively with peers to understand how individual students exhibit certain 21st century skills across subjects within the school.

Considerations

Informed by the research findings presented in this report, we offer the following considerations for state policymakers and leaders of Massachusetts schools and districts.

For state policymakers

Define 21st century skills. In the public debate, the term "21st century skills" has been used to mean different things. While Massachusetts is a member state in the Partnership for 21st Century Skills (P21), it is unclear whether or not state education leaders have fully embraced the P21 definition of 21st century skills. The Rennie Center's statewide survey revealed that only 27% of school and district leaders feel that state policymakers have clearly defined 21st century skills. If the state plans to infuse 21st century skills into the statewide standards, assessment and accountability system, then a common definition will be required.

> Only 27% of school and district leaders feel that state policymakers have clearly defined 21st century skills.

This common definition, however, should not be too prescriptive. A key finding among the small sample of school and district leaders interviewed for this study, is that rather than adopt a pre-packaged set of 21st century skills, these leaders have incorporated the 21st century skills that they and their stakeholders believe best address the needs of their students. Therefore, any definitions provided at the state level should allow the flexibility necessary for schools and districts to adopt the skills and competencies they and their stakeholders believe match their students' needs.

Provide greater leadership and support. According to our survey results, incorporating 21st century skills into teaching and learning is viewed as important and is a priority for a vast majority of district leaders statewide. While opponents of 21st century skills argue that districts where students have not yet mastered reading, writing and mathematics skills should focus exclusively on core academic content, the study revealed that most school and district leaders (78%) believe all public schools in Massachusetts should be required to integrate 21st century skills into learning. Very few (just 10%) believe that in schools where students are lacking adequate basic skills, it is unrealistic to expect educators to integrate 21st century skills into learning.

The findings also make clear that school and district leaders do not think state policymakers are supporting the integration of 21st century skills into teaching and learning. As a result, state policymakers on the Board of Elementary and Secondary Education should begin working to develop policies that support integration of 21st century skills and to align policies regarding standards, curriculum, assessments and accountability to promote deeper integration of 21st century

skills. State policymakers should consider engaging school and district leaders who are already integrating 21st century skills in the development of these policies. Based on these policies, the Department of Elementary and Secondary Education should move forward with developing a statewide strategy for integrating 21st century skills into public schools and districts. Such an effort should establish a statewide framework of expectations for the comprehensive integration of 21st century skills. The state legislature should consider providing funding to support programs and policies that focus on the comprehensive integration of 21st century skills.

Survey findings that support this consideration:

- Only 22% of school and district leaders believe state policymakers have consistently set policy that supports student mastery of 21st century skills.
- Only 25% of school and district leaders believe policymakers have ensured that standards, assessments, professional development and curricula are aligned, and include 21st century skills.
- Only 25% of school and district leaders believe state policymakers create tangible incentives for educators to lead, teach and assess 21st century skills.
- Only 26% of school and district leaders believe policymakers have ensured appropriate funding to support and monitor progress on the comprehensive integration of 21st century skills across the educational system.

Focus on ensuring that 21st century skills have been fully integrated into teaching and learning statewide before holding schools and districts accountable. A key finding of the study is that the integration of 21st century skills into teaching and learning is a process that takes time. Even in schools and districts that prioritize 21st century skills integration, few are at the stage where these skills are fully integrated. Among the schools that have included particular 21st century skills in their mission/vision for student learning, survey findings show that most have not yet developed goals for measuring students' mastery of these skills. Interviews with our small sample of administrators and educators revealed that 21st century skills are assessed at the classroom level but school- and district-wide assessments are viewed as a future step in the process of fully integrating 21st century skills. To date, the Commonwealth's schools and districts are not ready to be held accountable for 21st century skills. With plans underway for a new state assessment system in the 2014-15 school year that assesses students' core content knowledge and 21st century skills, state policymakers should consider using these assessments for accountability purposes only after schools and districts across the state have had an adequate amount of time and support to integrate these skills into teaching and learning.

Survey findings that support this consideration:

- 74% of superintendents indicated that ensuring that a majority of student work is evaluated at the classroom level for mastery of 21st century skills is a priority.
- Only about half (51%) of school and districts leaders agree that the state should become a national leader in assessment by integrating the measurement of 21st century skills throughout the MCAS.[35]
- Only 48% of school and district leaders agree that the state should hold teachers and administrators accountable for incorporating 21st century skills into the curriculum and hold students accountable for learning them.[36]
- Only 20% of school and district leaders believe state policymakers invest in assessments that cover student mastery of 21st century skills.

35 Rennie Center for Education Policy & Research. (2010). *21st Century Skills State Policy Initiatives: School Leaders' Views*. Retrieved from: http://renniecenter.issuelab.org/research/listing/21st_century_skills_state_policy_initiatives_school_leadersa_views.

36 *Ibid.*

Support teacher training and professional development. Survey findings revealed that most school and district leaders believe teachers should have competence in the use of technology and most place a high priority on providing teachers with professional development to improve their ability to integrate 21st century skills into the teaching of core academic content. School and district leaders also believe it is important to overhaul the state's teacher training and professional development programs to include 21st century skills. Yet, most of the school and district leaders surveyed do not feel that state policymakers have invested in educator professional development that covers student mastery of 21st century skills. As a result, state policymakers should consider investing in and developing policies to support teachers' professional development and to ensure teacher preparation programs train teachers on how to teach core content in ways that enhance students' mastery of 21st century skills.

Our interviews with school and district leaders for whom 21st century skills integration is a priority revealed that they rely heavily on their own staff to train and support teachers in the integration of 21st century skills. Thus, the amount of funding needed to support professional development can be minimized by tapping into the "home-grown" expertise of classroom teachers who are leaders in effectively integrating 21st century skills with content. Such efforts, moreover, have the potential to support and foster collaborative learning communities within schools that can better target practices to the specific needs of the students they serve and ensure that content and skill development is fully aligned within their curricula.

Survey findings that support this consideration:

- 90% of school and district leaders agree that all teachers should have technological competence and the ability to help students use technology effectively.
- 86% of superintendents indicated that providing professional development that focuses on improving educator capacity to teach core content in ways that enhance 21st century skills mastery is a priority for their district.
- 69% of school and district leaders agree that the state should overhaul the state's teacher training and professional development programs to recruit and retain high achieving educators who have a background in and up to date knowledge of 21st century skills.[37]
- Only 28% of school and district leaders agree that state policymakers have invested in educator professional development that covers student mastery of 21st century skills.

Make technology literacy a priority. District leaders who responded to our survey indicated that ensuring students acquire technology literacy is among the 21st century skills that is of highest importance. Technology literacy means the ability to use technology as a tool to research, organize, evaluate and communicate information; use digital technologies, communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information; and apply a fundamental understanding of the ethical/legal issues surrounding the access and use of information technologies.

Our interviews with school and district leaders and teachers in districts that have placed a high priority on the integration of 21st century skills revealed that schools and districts that do not have as much technological capacity as they would like have set goals for acquiring that technology and teaching students and educators how to use that technology. In the schools and districts that have technology equipment and infrastructure in place, staff members have shifted from teaching students how to use technology, to using the technology as a tool to improve the teaching and learning of core content. Teachers whose students use technology to create videos, photo stories, audio stories and other types of multimedia projects believe that providing students with these additional options for working with content and presenting what they have learned engages students in their learning and deepens and reinforces their understanding of concepts.

37 Rennie Center for Education Policy & Research. (2010). *21st Century Skills State Policy Initiatives: School Leaders' Views*. Retrieved from: http://renniecenter.issuelab.org/research/listing/21st_century_skills_state_policy_initiatives_school_leadersa_views.

A final reason for making technology literacy a priority is that providing students with access to and ensuring their proficiency with technology can help low-income students to be as prepared as their more affluent peers for the technological requirements of postsecondary education and the modern workplace. Building all students' technology literacy will become increasingly important as the state moves toward computer-based assessments, like those being developed by Partnership for Assessment of Readiness for College and Careers,[38] that require students to locate and evaluate information obtained online, use video and audio clips, and respond to innovative item types such as those involving "drag-and-drop" input to populate lists and highlight text in passages. To this end, policymakers should consider supporting competitive grant programs, especially for the districts that serve the poorest students to purchase technology equipment and support the integration of technology into teaching and learning, including professional development for educators.

Survey findings that support this consideration:

- Superintendents rated technology literacy among the most important skills for educators to teach and for students to learn. The mean rating was 4.7 on a 5 point scale where a 5 means "extremely important."
- 90% of school and district leaders agree that all teachers should have technological competence and the ability to help students use technology effectively.
- 86% of superintendents indicated that providing appropriate technology infrastructure and tools that support student acquisition of 21st century skills is a priority.
- 49% of schools include technology literacy as part of their school mission.
- 65% of schools that include technology literacy as part of their mission have developed measurable goals for student mastery of the skill.

For school and district leaders

As society changes, the knowledge and skills required for citizens to navigate the complexities of life and work must also change. As a result, some argue that schools must provide students with a broader set of skills that will enable them to thrive in our increasingly diverse, rapidly evolving and globally-connected world. While opponents of 21st century skills argue that districts where students have not yet mastered reading, writing and mathematics skills should focus exclusively on core academic content, the study revealed that most school and district leaders (78%) believe all public schools in Massachusetts should be required to integrate 21st century skills into learning. Very few (just 10%) believe that in schools where students are lacking adequate basic skills, it is unrealistic to expect educators to integrate 21st century skills into learning. Moreover, the Commonwealth has taken steps toward developing a statewide strategy for integrating 21st century skills into public education. It is within this context that we provide the following considerations for school and district leaders.

Engage key stakeholders in strategic planning. School and district leaders who have not yet started to integrate 21st century skills into teaching and learning should begin by engaging key stakeholders in strategic planning. Interviews with both superintendents and principals suggest that creating a learning environment that fosters student mastery of 21st century skills is a process that takes time and involves setting intentional short and long-term goals, action steps and a timeline for accomplishing them. The districts interviewed for this study began with a strategic planning process that engaged a range of stakeholders, including teachers, administrators, students, families, community members and business leaders. These discussions were integral to rethinking district-wide priorities for student learning and building consensus across all stakeholders. Study findings suggest that strong school leadership, including teacher leaders, and professional development are critical to creating a shared vision for the successful integration of 21st century skills.

38 Partnership for Assessment of Readiness for College and Careers. (2010). *Race to the Top Comprehensive Assessment Systems Competition Application.* Retrieved from: http://www.fldoe.org/parcc/pdf/apprtcasc.pdf.

Empower teachers to lead the way. Interviews with school and district leaders for whom integration of 21st century skills is a priority revealed that they create a culture that fosters that integration by setting expectations for their staff, modeling behavior and empowering teachers to lead the way. In most schools and districts studied, teacher leaders and teacher-led groups have been essential in building support, sustaining the effort and ensuring that newly established school and district priorities are central to school-level discussions about curriculum, instruction and professional development. Empowering teachers to develop and lead training, and creating the necessary opportunities for ongoing collaboration are common strategies among schools that have been integrating 21st century skills into teaching and learning.

Learn from early-adopters and facilitate sharing among colleagues. This report profiles only a small sample of the schools and districts across the state that have made progress in creating learning environments that foster student mastery of 21st century skills. There is much to be learned from these and other schools and districts that are at various stages in the process of integrating 21st century skills. District and school leaders can benefit from talking with colleagues who have addressed many of the challenges involved in such an effort. School and district leaders should consider arranging time for their teachers to visit schools that are teaching 21st century skills alongside core content so they can observe, ask questions and gather ideas that can be brought back and shared with educators in their schools. Once work is underway in a school or district, leaders can encourage sharing of best practices within their own buildings and across schools within their districts.

Conclusion

Changes in the social, political and economic climate, combined with new technologies, have substantially altered the way we live and work. School and district leaders in various communities across Massachusetts have responded to these changes by transforming their schools into learning environments where students simultaneously build knowledge of core academic content and 21st century skills, and have ample opportunity to apply their knowledge and skills in relevant, real world situations. Guided by strong administrative and teacher leadership, these schools are becoming fundamentally different places to learn: students are active and self-directed learners; instruction is interdisciplinary and project-based; technology is an integral teaching and learning tool; and educators use their expertise to provide training and support to their peers. These changes have not been driven by state or federal policy, but instead have developed from the ground up in response to what school communities believe students should know and be able to do. While the public debate about the merits of "21st century skills" continues, some schools and districts across the Commonwealth have already decided the direction they will take. These schools and districts will continue to strengthen their own standards to ensure that their students are ready for college, careers and life. State policymakers would do well to provide leadership and support on the integration of 21st century skills into teaching and learning to all of the Commonwealth's schools and districts, to ensure that all students have an opportunity to be successful in the next phase of education reform.

Appendix A–Study Participants

DISTRICT AND SCHOOL NAME	PARTICIPANTS
Arlington Public Schools	Wallis Raemer, Interim Superintendent
Arlington: Arlington High	Charles Skidmore, Principal Cory Gunther, 9th and 10th grade biology and physical science Paul McKnight, 9th and 11th grade English
Boston: Lilla G. Frederick Pilot Middle	Deb Socia, Principal Jon-Mychal Bowman, 6th grade mathematics and science Melissa Graham, 8th grade humanities Nina Lessin-Joseph, 6th-8th grade ELL
Brockton Public Schools	Matthew Malone, Superintendent
Brockton: Brockton High	Susan Szachowicz, Principal Kaitlin Clark, 10th-12th grade mathematics Jodie Nelson, 10th grade English and college preparation Craig Savery, 10th-12th grade history
Chatham: Chatham High	Paul Mangelinkx, Principal David Alexander, 10th-12th grade social studies/personal finance Wes Chapman, 10th-12th grade chemistry and physics Kelly Terrenzi, 10th-12th grade mathematics Pat Vreeland, School Nurse, 12th grade health seminar
Hill View Montessori Charter Public	Janet Begin, Executive Director Kristen Bilodeau, 4th-6th grade all subjects Amanda Smart, 1st-3rd grade Laura Tilley, 1st-3rd grade Ali Vandenburgh, 7th grade humanities
Natick: J. F. Kennedy Middle	Rosemary Vickery, Principal Marimartha Clark, 7th and 8th Spanish and ELL Stacy Gauthier, 7th grade science Paul Power, 8th grade science Katherine Presswood, 7th and 8th grade French
Pentucket Regional School District	Paul Livingston, Superintendent
Reading Public Schools	John Doherty, Superintendent
Reading: Birch Meadow Elementary	Eric Sprung, Principal Melissa Fleishman, 5th grade science Courtney Quinlan, 4th grade & Assistant Principal

DISTRICT AND SCHOOL NAME	PARTICIPANTS
Shrewsbury Public Schools	Joseph Sawyer, Superintendent
Shrewsbury: Oak Middle	Christopher Starczewski, Principal Courtney Mulcahy, 8th grade mathematics Christine O'Connor, 8th grade mathematics Derek Pizzuto, 7th and 8th grade English
Shutesbury: Shutesbury Elementary	Robert Mahler, Principal Marcia Bernard, Library Teacher Debbie Lee, Technology Coordinator Heather Lobenstine, 4th grade
Somerville Public Schools	Anthony Pierantozzi, Superintendent
Somerville: East Somerville Community	Holly Hatch, Principal Laura Bonnell, Assistant Principal Jacqueline Brown, Counselor Felix Caraballo, 5th and 6th grade bilingual Gregory Cook, 7th and 8th grade social studies Mark Ferrera, 7th and 8th grade science Roy Gardner, 7th and 8th grade English language arts Mary McClellan, 3rd grade Liz McKenney, Redirect Teacher Jack O'Keefe, 7th and 8th grade mathematics Betsey Reardon, 1st grade bilingual
Springfield Public Schools	Alan Ingram, Superintendent
Springfield: The Springfield Renaissance	Stephen Mahoney, Principal Arria Coburn, 7th grade special education Aurora Kushner, 9th grade science Marisa M. Vanasse, 11th grade U.S. history Keith Wright, 8th grade science
Watertown Public Schools	Ann Koufman-Frederick, Superintendent
Watertown: Watertown High & Watertown Middle	Paul Michael Noftsker, Principal, Watertown High Malcolm Cooke, 9th and 11th grade English Kraig Gustafson, 9th and 10th grade U.S. history Elizabeth Kaplan, 7th grade science Karen MacAulay, 7th grade science Vera Ventura, Media and Communications Dan Wulf, 6th-12th grade Mathematics Coordinator
Whitman-Hanson Regional School District	Ruth Gilbert-Whitner, Superintendent

Appendix B–Case Studies

The following case studies highlight two public school districts in Massachusetts that have made intentional commitments to create learning environments that foster student mastery of 21st century skills. The two districts described below, one suburban and one urban, provide examples of two different approaches to integrating 21st century skills into teaching and learning. The first case study of the Reading Public Schools illustrates a district-led approach. The second case study of the Brockton Public Schools is an example of how one school has spurred a district focus on integrating 21st century skills. The purpose of the case studies is to show the progression of 21st century skills integration at the district level and how the themes described in the previous sections of this report are illustrated by these two districts.

CASE STUDY 1

Reading Public Schools: Expanding the Boundaries of Teaching and Learning

> "The Reading Public Schools strives to ensure that all students will have common challenging meaningful learning experiences in the academics, health and wellness, the arts, community service, co-curricular activities and athletics. We will lead and manage our school community to reflect the values and culture of the Reading Community, and guide and support our students to develop the appropriate skills, strategies, creativity and knowledge necessary to be productive informed independent citizens in a global society."
>
> Mission Statement, Reading Public School District

Located in suburban Reading, Massachusetts, about 15 miles north of Boston, Reading Public Schools has a total enrollment of about 4,400 students. There are eight schools in the district: five elementary schools, two middle schools, and one high school. Reading is six years into a district-wide effort to better prepare students for success in a 21st century global society, a process that began with the development of their current mission statement.

Like many districts included in this study, Reading expanded its priorities for student learning through a strategic planning process that drew on the input from a broad coalition of school and community leaders. Initiated by former Superintendent Patrick Schettini, this work started with conversations among members of the school and community planning team. The group read a variety of texts that outlined the challenges and opportunities facing students in an increasingly interconnected, globalized world and highlighted how schools and classrooms need to change to better prepare students to face these challenges and opportunities.[39] According to current Superintendent John Doherty, this planning process was critical in getting people to re-conceptualize district goals to provide students with a set of skills, including collaboration, communication, creative thinking, media literacy and technological proficiency that both complement and expand upon core academic content in statewide curriculum standards. As Superintendent Doherty notes, *"[state] standards are a small component of what we want our students to know."*

Building Capacity at the School-Level for 21st Century Skills

In order for the district to make progress on its new goals, district leaders had to inspire principals and teachers to incorporate new ways of teaching. A central question that emerged for educators during this planning process was, *"how do you change the way you teach to prepare students for a global society?"* To address that question, Superintendent Doherty developed a six-credit course for school administrators and teachers called, *Expanding the Boundaries of Teaching and Learning.* The course, which will enroll its third cohort in the fall of 2010, is designed to both facilitate understanding of district-wide priorities to integrate 21st century skills into student learning goals and provide practical examples of how to use instructional technologies to improve students' collaboration, problem-solving, communication and

39 These included Thomas Friedman's, *The World is Flat (2005); Rising Above the Gathering Storm* (2007); and, The New Commission on the Skills of the American Workforce, *Tough Choices or Tough Times* (2007).

reasoning skills. For teachers like Melissa Fleishman of Birch Meadow Elementary School, the course provided a practical approach to improve teaching by showing teachers how to integrate 21st century skills with core content in a way that is not seen as an *"add on."* Although not a requirement, the course has been a popular draw within the district. Nearly all administrators and 62 teachers have completed the course. The course has been integral to increasing teachers' commitment to 21st century skill-building through the creation of a common knowledge base and the provision of support for educators to take risks and innovate. The course has also proven to be valuable in building capacity and leadership at the school level to fundamentally change school culture and classroom practices.

A key outcome of the *Expanding the Boundaries* course was the alignment of district priorities. According to Superintendent Doherty, *"Any time a new initiative was being introduced that focused on 21st century skills or technology, [principals and teachers] understood why we were doing it, and they were much more supportive."* Eric Sprung, Principal at Birch Meadow Elementary, notes that integrating 21st century skills *"is easy to do at the school level, because there is a strong push from the district perspective in how we are committed to 21st century skills."* For his part, Principal Sprung established a cooperative, shared leadership structure at Birch Meadow Elementary in which teachers are active members of various school-based committees and are regularly given the opportunity to lead staff meetings. Principal Sprung also maintains a blog, produces weekly memos that highlight innovative instructional practices and actively uses interactive technologies during staff meetings as an implicit way to encourage teachers to be more innovative in their classrooms. He explains, *"[Innovating] is always something they should be thinking about."*

Teachers as Education Innovators

A key district approach to increase integration of 21st century skills is to empower teachers to take risks and try new ways to improve teaching and learning. As Superintendent Doherty asserts, *"you have to put [integration of 21st century skills] in the hands of the 'go-getters,' because you have to start slowly changing the culture."* The primary driver of instructional change in Reading is finding new ways to use technology and project-based lessons to support student engagement and learning of both core academic content and 21st century skills. Teachers like Ms. Fleishman approach lesson planning with the end goal in mind, asking, *"what are the standards within the statewide curriculum frameworks that students need to learn?"* To ensure her instruction focuses on the standards, not the technology, Ms. Fleishman, *"plans as if there is no technology in the world and then asks the questions: What will help me do this? What will bring it to life for the kids? I don't want to plan technology first; I want to plan good teaching."*

Teachers at Birch Meadow Elementary who are more adept at integrating instructional technologies formed a Technology Committee to provide technical assistance and workshops for peers. This work is supported by the Reading Parent Teacher Organization and Reading Technology Foundation, which have both raised funds for the district to expand their investments in various technologies, including SMART Boards,[40] mobile computer labs, and online teaching tools.

Teachers are also given an opportunity to share their classroom innovations with one another through the district's annual conference, the Blueprint for Educational Excellence National Institute. Started four years ago as a district-wide staff sharing day each April and modeled after the annual conference of the Blue Ribbon Schools of Excellence,[41] the professional development day has evolved into a two-day national conference that draws educators from across the country to take part in over 100 different workshops and school site visits. The conference is a partnership between Reading Public Schools and the Blue Ribbon Schools of Excellence, which has been working with the district since 2001 on school assessment and improvement plans. Eighty percent of the workshops are designed and run by Reading educators, reflecting the district's emphasis on teacher-directed professional development. The development and presentation of a workshop at the conference is also a requirement of the *Expanding the Boundaries* course. In 2010, 350 educators attended the conference, much of which focused on incorporating technology into the classroom and building students' mastery of 21st century skills.

40 SMART Boards are interactive whiteboards sold by SMART Technologies, http://smarttech.com/.

41 For more information, see http://www.blueribbonschools.com/.

Accountability for a 21st Century Education

According to district administrators and teachers, integrating 21st century skills into the teaching of core academic content improves instruction, student engagement and learning. Reading has begun to develop assessments to measure this. At the district-level, teachers and administrators are developing and refining common rubrics for assessing performance-based tasks. At Reading Memorial High School, faculty recently completed a yearlong project to integrate performance-based student assessments across all departments in the school. The goal of the assessments is to better assess student mastery of 21st century skills as well as core academic content.

Reading is also working to incorporate 21st century skills into its evaluations of principals and teachers. During the 2009-10 school year, Reading piloted a new evaluation system for principals that is focused on six standards of leadership. Each standard is composed of multiple indicators to measure, among other things, principals' efforts to foster the integration of 21st century skills in their schools. Teachers are also held accountable for how they align their instructional practices to district-wide priorities for 21st century learning through both formal and informal evaluations. Reading instituted an *"alternative evaluation"* option for teachers who want to work, often in collaboration with peers, on a multi-year project focused on a specific element of classroom instruction, including 21st century skills integration. In addition, Principal Sprung at Birch Meadow Elementary provides teachers with regular feedback on to the extent to which they communicate and share practices effectively with peers, parents and students. All Birch Meadow Elementary teachers are required to keep their classroom web pages up to date and to produce a multi-media presentation using digital photographs for the principal's blog every year.[42]

CASE STUDY 2

Brockton Public Schools: Building Skills to Raise Achievement

> "If education is the great equalizer, then Brockton is that level playing field where the children learn the skills they need to compete in a global society."
>
> Superintendent Matthew Malone, Brockton Public Schools

Located in southeastern Massachusetts, Brockton Public School District educates more than 15,500 students in 23 schools. Like many urban districts in the state, Brockton has a high percentage of minority and low income students, and about a third of its student population is English language learners (ELLs). Over the past decade, the district has made impressive gains in student achievement, and ranks near the top among all urban districts in Massachusetts. Yet, Brockton is not satisfied with its success and has come to view the integration of 21st century learning as a means to meet the diverse and significant needs of its student body and to prepare them for success in college, career and life.

When Superintendent Matthew Malone was hired in 2009, he initiated a ten-month strategic planning process that drew input from across the Brockton community. The planning process culminated in a new district strategic plan, *R3 –Realigning Resources for Results,* presented to the School Committee in January 2010. As Superintendent Malone notes, *"our Theory of Action is all about what the 21st century world looks like."* In his view, it is time to re-think Massachusetts' approach to education and better align systems, policies and funding to the realities of a 21st century global society. *"This is about belief systems,"* Superintendent Malone observes, *"most school systems in the state are focused on doing what they have always done…there needs to be some conversation and dialogue about visioning what the future [of education] should be."*

42 This case study was based upon a series of interviews with district and school-level staff, including: Superintendent John Doherty, June 15, 2010; Principal Eric Sprung, Birch Meadow Elementary School, May 27, 2010; and Birch Meadow Elementary teachers Melissa Fleishman and Courtney Quinlan, May 27, 2010. District profile and accountability data were retrieved from the Department of Elementary and Secondary Education website: http://profiles.doe.mass.edu/.

A Focus on Content and Skills for Student Success: The Example of Brockton High School

According to Superintendent Malone, Brockton's schools and educators, at Brockton High School in particular, have led the way in integrating 21st century skills into the core subjects across the K-12 continuum, providing a foundation upon which the district's current strategic plan was built. With over 4,000 students and nearly 300 teachers, Brockton High is the largest high school in New England. Ten years ago Brockton High was facing a 75% failure rate on the MCAS tests. It was clear to faculty that they could not continue to do what they had always done—it was obviously not working for students. Such poor student performance precipitated a re-thinking of teaching and learning standards for the school that, in turn, led to a new focus on building students' communication, collaboration and problem solving skills to aid in improving their understanding and retention of core academic content. As Brockton High Principal Susan Szachowicz notes, *"When the first round of MCAS scores came in, and they were pitiful, we asked ourselves: 'Is this the best we can be? What are we teaching, how are we teaching it, and how do we know the kids are learning?'"*

In response to their students' low test scores, Principal Szachowicz and her staff implemented a focused initiative at Brockton High during the 2001-02 school year. At the core of this initiative is an emphasis on higher level thinking and learning skills in four key areas, which the district has named its *"four literacy objectives"*: reading, writing, speaking, and reasoning. The goal of the *"four literacy objectives"* is to ensure that all teachers and students share expectations for teaching and learning related to particular 21st century skills that cross all content areas, including problem solving, critical thinking, communication, collaboration and reflection.

Principal Szachowicz argues, *"It is not just about content here. Content is the means to teach the [four] literacy objectives. If I am doing a lesson on graphing and I am a history teacher, I am using the content of my subject but I am not just teaching the economic or political trends. I am teaching you how to analyze a graph or chart and think it through to make the right connections."* The school intentionally embedded the 21st century skills that are more content driven, such as global awareness and health and financial literacy, into an interdisciplinary curriculum across all academic departments in the high school. Technology and technological literacy was seen not as a specific set of skills to be taught to students, but rather as a set of tools to improve how students use and think about content. According to Principal Szachowicz, *"we had a very serious and pointed discussion about whether technology should be one of the literacy skills and decided that, no, it is a tool to get at those literacies and make them more accessible."*

Assessing Instructional Practices for School-Wide Coherence

Faculty at Brockton High are disciplined in their approach to accountability. Every teacher is required to have a literacy objective every day and lesson plans are collected and analyzed by department heads and administrators to ensure high levels of rigor and relevance to students. Teachers meet twice a month in both interdisciplinary and departmental teams to discuss and address the four literacy objectives. In order to assess student mastery of these skills, the faculty developed common rubrics. Rubrics are first used by students and teachers to assess student work, before being collected by department heads, who analyze them to ensure consistency across the school. Ultimately, these assessments are used to determine teachers' ongoing professional development needs and to ensure that specific priorities for student learning are aligned across all grade levels and subjects.

Principal Szachowicz and her staff's focus on clear goals and expectations has led to significant improvements within Brockton High, which went from a 44% failure rate in ELA and a 75% failure rate in Math when MCAS was first instituted in 1998, to a less than 10% failure rate in ELA and 15% failure rate in Math in 2009. Brockton is now at the top of nearly every performance measure among urban districts in Massachusetts. *"Raising the rigor changed the culture of the school. I've been in the business for over thirty years and terms come and go that are catchy… [21st century skills] are just good skills kids need to know."* Moreover, Principal Szachowicz explains, *"what I like about 21st century skills is that [they] will make individuals successful in the workplace."*

Aligning Strategic Priorities

As described above, the district built upon the work of leaders and educators at Brockton High to develop a new strategic plan for the district known as *R³–Realigning Resources for Results.* Created in collaboration with administrators, teachers, community-based organizations, parents, students and business leaders in Brockton, the plan outlines a set of goals to bring Brockton Public Schools up to 21st century standards and accelerate student achievement. The plan is based on strategic objectives in the following areas: learning and teaching; performance management; human capital; and resource reallocation. Within these objectives are 29 strategic initiatives the district will address over the next five years. It is important to note that district leaders made a conscious decision not to use the term "21st century skills" in its new strategic plan because of the potential for people to view it as just another reform fad. As Superintendent Malone notes, *"we were concerned that it was such a buzz term that we removed it from the plan."* While not using the term, Brockton's five-year strategic plan does retain a strong emphasis on skills this study defines as 21st century skills.

The district is also looking for ways to incorporate the educational philosophy of current successful programs that focus on 21st century skills, like the International Baccalaureate program at the middle and high school levels, into the curricula at other schools. Some of Brockton's more innovative efforts to integrate 21st century skills occur in its various *"pathway programs,"* designed to provide high school students with alternative pathways to college and career readiness. The district has sought to expand its capacity for delivering 21st century learning by developing strong partnerships with the local Workforce Investment Board and with Commonwealth Corporation.[43]

Measuring Success across the District

With a set of strategic priorities in place, Brockton is now focused on developing the metrics and accountability systems to track and monitor their results district-wide. Building upon the work at Brockton High, Superintendent Malone's team is developing school-level rubrics to hold teachers and students accountable for mastery of certain skills. To ensure coherence, the district is working to align teacher and principal evaluations with instructional priorities and school-based goals for integrating 21st century skills across all subjects and grade levels.

Capitalizing on the strength of its partners, Brockton is working to find new uses for Commonwealth Corporation's *Work-Based Learning Plan*. The plan, according to district administrators, is *"an instrument that we use a lot here to evaluate the quality of kids' 21st century skills. It is a vehicle to look at individual students. It is not yet to scale to assess all students in the high school, but we are looking at it."*

Educators and school leaders in Brockton understand that they need to stay attentive to providing students with the mix of good instruction and experiences that will improve learning, engagement, and, ultimately, success in college, career and life. As one member of the district's leadership team observed, *"The fact is, for any of us trying to be effective in the 21st century, we all need a really nimble method for understanding where things are and where things are headed...we have to retrain ourselves."*[44]

43 Commonwealth Corporation is a statewide workforce development agency with programs to expose students to a variety of 21st century life and career skills, as well as health literacy, global awareness, and financial literacy.

44 This case study was based on a series of interviews with Brockton Public Schools' Superintendent Matthew Malone and his leadership team, June 11, 2010; Brockton High School Principal Susan Szachowicz, May 11, 2010; and Brockton High teachers Jodie Nelson, Kaitlin Clark and Craig Savery, May 11, 2010. It is also based on district documents: Brockton Public Schools. (2010). *Realigning Resources for Results (R³)*; Matthew H. Malone. (2010). *Entry Report: Brockton Public Schools.* District profile and accountability data were retrieved from the Department of Elementary and Secondary Education website: http://profiles.doe.mass.edu/.